MARCH 1960

SAFETY NEWS

A NATIONAL SAFETY COUNCIL PUBLICATION

24th annual safety equipment issue

1960

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24th Annual Safety Equipment Issue

NATIONAL SAFETY COUNCIL

Chartered by the Congress of the United States

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EDITORIAL

Honey, You Take Me for Granted!

IN RECENT YEARS there has been a heavy emphasis on the *human side of safety*. Article after article tells us that the real culprit in the safety picture is the unsafe attitude, breeding the unsafe act—ending with an accident.

Far be it from us to argue with those who stress the need for more alertness, more courtesy, more safety-mindedness. Everyone is aware of the continuing need for emphasizing safe attitudes.

But there is danger that we might give *all* our attention to the human factors and forget that our most effective year-in, year-out barrier against accidental injury is the protective equipment we place between the hazard and the worker.

Consider the following:

Item 1. The greatest strides in cutting down the industrial accident toll were made in the early decades of organized safety when machine guards, hard hats, and safety shoes first entered the industrial picture in quantity. Plants that pioneered the use of these protective devices achieved almost unbelievable reductions in their accident tolls. Progress has slowed as effort has concentrated on the much more complex human factor.

Item 2. There is a correlation between companies that are heavy users of safety equipment and those with top safety records. They go hand in hand. Moreover, the use of safety equipment is more likely to be routine in larger plants with highly organized safety programs—less likely in the smaller ones. And so it is with safety records. Studies have shown that large plants are likely to be safer than small ones.

Item 3. The 60's usher in an era of large-scale use of radioisotopes in industry. Safety men are now becoming familiar with this new, mysterious hazard. (See Section 10, Nuclear Radiation.) If hard hats and safety shoes are important in preventing falls and crushing injuries, Geiger counters and film badges are indispensable against the unsensed danger of nuclear radiation. This new industry, which has had safety interwoven in its procedures from the beginning, has turned in a remarkable record. To deal with a hazard you can't see, smell, feel, hear, or taste, you *must* use equipment—equipment you can trust.

Our faithful friends—from hard hats to Geiger counters—can chant with complaining wives, "Don't take us for granted." Husbands are prone to forget that wives cook the food, diaper the babies, keep the house—they do those sometimes routine but necessary jobs that make a house a home.

The safety man, too, should not take protective devices and equipment for granted; they are his major bulwark against accidents—the stuff from which safer plants are made.

NATIONAL SAFETY COUNCIL

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THE DIARY OF A SAFETY ENGINEER

By BILL ANDREWS

(Fiction)

A restful week end erases the frustrations of the past week and a Monday morning visit from Max, the equipment salesman, gets the new one off to a good start

BRIGHT MONDAY

March 7, 1960

SOME ESSAYIST (it may have been De Quincey) once said the perfect hiking trip was one where the hiker was equally glad to put his pack on in the morning and to take it off at night.

I think the same thing is true of work weeks.

Last Friday night I was very happy to see the clock reach five o'clock. It was an unmixed pleasure to sign my last letters, shove my pending work aside, and go out into the evening free of the burdens of the five long workdays past.

It wasn't a bad week. Taking it over all, it had been a pretty good one. I had only three major arguments, and I won one of them. A second never came to a decision, and the third is one that I'm beginning to suspect I was wrong about.

My staff worked through the week quite productively. They wound up a laborious eye survey covering three plants on the project. They held the first session of a new foremanship training program, on which I've labored many weary hours since Christmas. In addition, the normal routines of inspection, statistical recording, and the dissemination of safety literature have gone on without interruption.

There were some frustrations in the week. Tuesday brought a letter from an old colleague of mine from war-time years at the ordnance plant. He was down on his luck and looking for a better job.

I'm afraid I had little to offer him in the way of help. I had to write him that I'd only known him as a greenhorn and I couldn't judge his qualifications for a top safety engineering position. I offered to pass on his letter to some friends of mine, but I had to say I couldn't endorse it with a glowing testimonial.

Thursday I got word that several of my key recommendations on the lighting and ventilating for a new shop at the south end of the project had been rejected on the grounds of costs. Since I had argued for the recommendations on the basis that they could be expected to save money in the long run through increased productivity and reduced labor turnover, I was left with no additional ammunition to fire back to the plant management.

Finally, on Friday I was called into an executive committee session to hear a speech on labor relations by an expert from New York. I wasted two hours hearing him and then listening to our local personnel people tear some of his pet premises to shreds.

It was one of those annoying sessions in which I couldn't think of any bright way to tie in my safety concern with what was being discussed. It was only after it was over that I thought of all the bright things I should have said.

As I say, it was just another fair-to-middling week, and I came to the end of it tired, a little irritable, and most anxious to get home to my family.

My restful Saturday consisted of a walk with my children, a trip to the supermarket with my wife, four hours remodeling the attic as part of my project to create a new bedroom, and an evening of bridge with neighbors.

Sunday was church, dinner, a nap, some catch with my oldest boy in a muddy vacant lot, some television, and a session with a new book on industrial trends.

Like the week that preceded it, my week end was a quiet, fair-to-middling one with neither great joys nor great problems.

Yet the passage of the week end made great differences. By the time I really woke up (this after drinking two cups of coffee and driving half way from home to work), I encountered a new day, a new week, a new mood.

The sun broke through the clouds before I entered the plant gate, and the south wind blew warmly. I even remembered to ask the gate guard how his wife was getting along—I remember now I had only grunted at him when he said "Goodnight" Friday evening.

By the time I parked the car in the lot, I was already framing my first move in the office: a refiguring of cost on that lighting and ventilat-

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91,500 Fatalities in 1959

Accidental death totals in U. S. A. keep pace with growth in population

THERE WERE about 13,800 deaths from work accidents in 1959, or 500 more than in 1958. Increases were recorded in 5 of the 8 principal industrial groups; no change in 3.

For manufacturing, the death total was 1,900, or 100 more than in 1958.

In agriculture and service (including finance and government) deaths increased 100 each to 3,400 and 2,600 respectively.

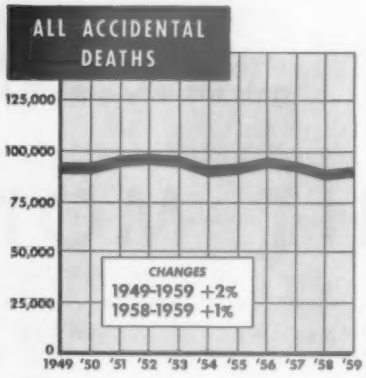
In contract construction and transportation, deaths also increased 100 each to 2,500 and 1,300.

For the other industrial groups, the 1959 death totals were the same as in 1958; trade 1,200, public utilities 200, and mining, quarrying, oil and gas wells 700.

Disabling injuries totaled about 1,950,000—8 per cent more than in 1958. Permanent impairment cases numbered about 85,000.

Employment in all industries during 1959 was about 3 per cent more than in 1958; manufacturing employment went up almost 5 per cent.

Accident rates cannot be computed at this time on a national scale. Preliminary information indicates that the all-industry frequency rate probably was higher than in 1958. Nonfatal injuries, as noted above, were higher than in 1958. Employment was up 3 per cent, and average hours worked per week were also up, resulting in more exposure than in 1958.



Accident costs. Wage loss, medical expense, and the overhead costs of insurance for work accidents in 1959 amounted to about $2,050,000,000.

So-called "indirect" costs are estimated at $2,050,000,000. These include such items as time lost by workers other than the injured, time lost by workers whose injuries were not serious enough to be classified as temporary total disabilities, interference with production schedules, and property damage. Total costs were about $4,100,000,000.

Off-the-job accidents. In addition to work accidents, off-the-job accidents to workers lowered the nation's productive capacity. The 1959 death toll from these accidents was approximately 29,800, and disabling injuries about 2,350,000.

Accidents to workers on and off the job totaled 43,600 deaths and 4,300,000 disabling injuries. Time lost during the year from these accidents (including indirect losses) amounted to about 285,000,000 man-days.

Fire loss. The 1959 total of property destroyed by fire reached $1,047,000,000, according to National Board of Fire Underwriters. This was 1 per cent less than the comparable 1958 total. In 1958, nearly half of the loss from building fires was in industrial and business establishments.

Industrial Commission records. Deaths reported to the Industrial Commissions in 23 states during 1959 totaled 6,610, or 2 per cent less than in 1958. Decreases of 1 to 46 per cent were recorded in 9 states; increases of 3 to 30 per cent occurred in 13 states; no change in 1 state.

THE NATIONAL ACCIDENT FATALITY TOLL

	1959	1958	% Change
All Accidents	91,500	90,500	+1
Motor-Vehicle	37,800	37,000	+2
Public Non-Motor-Vehicle	16,500	16,500	0
Home	26,500	26,500	0
Work	13,800	13,300	+4

Note: Motor-vehicle totals include some deaths also included in work and home totals. This duplication amounted to about 3,100 in 1959 and 2,800 in 1958. All figures are National Safety Council estimates.

WORK DEATHS IN 23 STATES

	1959	1958	% Change
Totals for 23 states	6,610	6,710	— 2
Alabama	104	80	+30
Arizona	86	77	+12
California	903	1,050	—15
Connecticut	77	69	+12
Florida	225	254	—11
Georgia	217	232	— 6
Idaho	41	76	—46
Illinois (8 mos.)	166	179	— 7
Kentucky	63	64	— 2
Maine	41	42	— 2
Massachusetts	579	543	+ 6
Missouri	96	74	+30
Nebraska	83	71	+17
New York	1,522	1,480	+ 3
North Carolina	144	114	+26
Oregon	124	120	+ 3
Pennsylvania	662	639	+ 4
South Carolina	84	81	+ 4
Texas	649	654	— 1
Virginia	224	200	+12
Washington	220	220	0
West Virginia	189	274	—31
Wisconsin	111	102	+ 9

WIRE FROM WASHINGTON

By **HARRY N. ROSENFIELD**
Washington Counsel, National Safety Council

● This report is an information service. Publication does not imply National Safety Council approval of or opposition to any legislation mentioned

CONGRESS has moved into high gear with respect to safety.

The President. In his budget message to Congress and in his economic message the President dealt with various safety and safety-related matters. In both he recommended to Congress an increase of ½ cent per gallon in the federal tax on highway fuels "to support the highway [construction] program at an increased level." The President asked Congress to continue a 4½ cent gas tax until June 30, 1964.

The President also asked Congress to increase the aviation fuel tax to 4½ cents per gallon and to impose a similar tax on jet fuel, to help finance "the budgetary costs of the airways system."

In his budget message the President requested substantial budgetary increases for safety programs in many federal agencies, including among others:

The Federal Aviation Agency; the Weather Bureau, for expanded research necessary to keep up with advances in air traffic controls; the Civil Aeronautics Bureau, for an increased rate of completion of accident investigations; the Public Health Service, for air pollution and radiological health control activities and expanding research on automotive exhausts; the Department of Agriculture, for research on safer chemicals for insect control; and the Department of Labor, for a comparison of state safety codes with standards recommended by the American Standards Association.

Industrial Safety. The President designated February 28-March 5 as National Job Safety Week. During that time the President's Conference on Occupational Safety met in Washington.

In his economic message to Congress the President included an analysis of injury frequency rates in manufacturing industries from 1946-1959. The 1958 rate was 10.9 disabling work injuries per million employee-hours worked; the preliminary rate for 1959 (based on data for the first nine months) increased to 12.1.

The Department of Labor issued preliminary estimates of job deaths and injuries. About 1,970,000 workers were disabled during 1959; 13,800 of these injuries resulted in death. The 1959 injury total is 8 per cent above 1958 and is the highest since 1953.

The injury rate rose from 29.4 per thousand workers in 1958 to 31.2 in 1959. The 1959 death rate of 22 per 100,000 workers matched the record low established in 1958, although the actual number of deaths was 4 per cent above the 1958 figure.

According to the Department of Labor, the principal increase in injuries occurred in manufacturing, from 340,000 in 1958 to 400,000 in 1959, a 17 per cent increase. Contract construction injuries increased 11 per cent. Coal mining, according to the Bureau of Mines, showed the lowest volume of injuries and deaths for any year on record.

At a press conference the President said "we ought to have a real overhaul of all regulations and controls" over railroads because "they are governed by antiquated laws and regulations."

The Interstate Commerce Commission released figures on accidents involving all linehaul, switching and terminal railroads for the first nine months of 1959. There was an 11.64 per cent decrease in deaths, compared with the same period in 1958, but a 5.53 per cent increase in injuries. The casualty rate for train and train service accidents dropped from 2.20 to 1.89; the injury rate rose from 13.02 to 13.34.

The secretary of the Department of Health, Education and Welfare announced a stepped-up program, closely cooperating with the Federal

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THE MONTH IN WASHINGTON

- **Department of Labor estimates 1,970,000 workers disabled, with 13,800 deaths, in 1959. Injury total is 8 per cent above 1958 and the highest since 1953. Largest increase in injuries is in manufacturing.**
- **Atomic Energy Commission issues notice of proposed rule-making on proposed amendment to radiation protection standards designed to deny licenses authorizing disposal of radioactive wastes on privately-owned sites by persons engaged in commercial radioactive waste-disposal.**
- **President advises Congress the Department of Health, Education and Welfare will propose legislation authorizing greater federal leadership in combatting air pollution.**
- **President designates February 28-March 5 as National Job Safety Week, during which President's Conference on Occupational Safety meets in Washington, D. C.**

Industrial Safety RESEARCH

Research is to see what everybody has seen and think about what nobody has thought.
Dr. Albert Szent-Györgyi

AS A SERVICE to investigators in scientific research, the National Safety Council has compiled the accompanying list of research projects which have come to its attention. Abstracts or summaries of each of these projects are available without charge and may be obtained from the Council's Research Division. Those wanting complete reports should write to the individual or institution conducting the research.

Listing these projects does not necessarily indicate endorsement or approval by the Council of the ideas, devices, methods, conclusions presented, etc.

To enlarge and enhance the value of this service, it is requested that individuals conducting or knowing of pertinent research submit short summaries or forward complete reports for abstracting to the Research Division of the National Safety Council.

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A NATIONAL SAFETY COUNCIL
TECHNICAL SERVICE

DATA SHEET 488

NONDESTRUCTIVE TESTING OF MATERIALS

Copies of this data sheet will be available for order within 30 days

Introduction

1. Nondestructive methods of testing materials are finding wide use in industry as important techniques for preventing accidents, emergency shutdowns of equipment, and production losses. By helping to determine the causes of equipment and product failures, these methods also aid in the process of redesign.

2. This data sheet is limited to the most commonly used nondestructive methods of detecting defects which cause failure in metal parts. Each of these methods is described, hazards which may be encountered in their use are indicated, and suitable precautions are suggested.

3. Visual observation, even with magnification, cannot reliably locate all small, tight-lipped defects. As a defective part is used, the defects gradually grow until the remaining metal can no longer bear the load. Then the part fails.

4. The various nondestructive methods of testing will reveal all such defects positively, without damage to the parts concerned, so that suitable action can be taken in time to prevent failure. If defects are found in new parts, the manufacturing process can be revised. A used part may be replaced by a new one, or the defect may be ground out and polished, repaired by welding, or otherwise corrected.

This Data Sheet is one of a series published by the National Safety Council, reflecting experience from many sources. Not every acceptable safety procedure in the field is necessarily included. This Data Sheet should not be confused with American Standard Safety codes, federal laws, insurance requirements, state laws, rules and regulations or municipal ordinances.

5. Defects may be classified into three groups:

a. Defects may be inherent in the metal itself. Examples are nonmetallic inclusions, shrinkage, porosity, segregations, and pipe.

b. Processing defects include seams, laminations, laps, cold shuts, bursts, poor bonds, high residual stresses, brazing strains, leaks, inadequate fusions, incomplete weld penetrations, and a wide variety of cracks and checks caused by handling or sprueing of castings, forging and trimming, welding, heat treating, grinding, and plating.

c. Service defects may develop from any of the inherent or processing defects or from notches, score marks, or sharp changes of section. Other causes are improper design, incorrect chemical composition, faulty internal structure, and such operating conditions as corrosion, erosion, and the like.

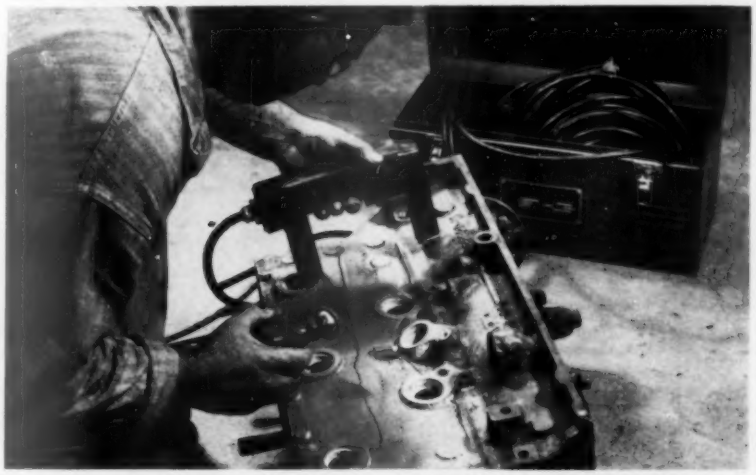


Figure 1. Magnetic particle inspection of an engine block. Note cracks which become visible as magnetic field is set up by the use of a yoke and the application of dust particles. (Courtesy Magnaflux Corp.)

Figure 2. Punch press crank shaft with a fatigue crack on the fillet, detected through magnetic particle inspection. (Courtesy Magnaflux Corp.)

6. Because stresses are almost always maximum at the surface, fatigue cracks in that area are by far the most common cause of failure. Among other causes are stress corrosion, erosion, graphitization, hydrogen embrittlement, brittle failures, and overload. Failure may also result from pinholes and cracks in glass linings and organic resin coatings and from leaks in stainless steel and similar linings.

7. All nondestructive tests have certain advantages as well as certain limitations in scope and sensitivity, and one may overlap another in range. These advantages and limitations must be understood before the most effective type of test for a particular application can be specified.

8. The types of tests most widely used are:

a. Magnetic particle
b. Penetrant
c. Filtered particle
d. Ultrasonic
e. Triboelectric
f. Charged particle
g. Radiography
h. Electromagnetic

Magnetic Particle Methods

9. Magnetic particle inspection is the most widely used test method. It utilizes magnetism to attract and hold very fine magnetic particles right on the part itself. If a defect is present, it interrupts the magnetic field and is clearly shown by the pattern made by the particles. The part is magnetized in suitable directions by appropriate AC line voltages transformed to low-voltage (4 to 18 volts), high-amperage AC, by half-wave current, or by three-phase full-wave current.

10. Portable equipment is available that includes facilities for setting up magnetic fields of suitable strengths for magnetizing and demagnetizing. A yoke sets up a magnetic field as particles are applied. Shaft-like parts, such as auto spindles, can rapidly be inspected through use of a coil. This equipment, operates off 110-volt AC to provide AC or half-wave output. Both a means for controlling current and an ammeter visible to the operator are included.

11. Inspection materials are finely divided ferromagnetic particles selected, ground, and controlled to provide mobility and sensitivity. Materials are available in several forms and colors. The type of defect to be located and the condition of the surface to be inspected determine which form of material and which method—dry, wet, or fluorescent—should be used. Color is selected to provide maximum contrast with the surface of the part.

12. In the *dry method,* the particles are in powder form and are applied sparingly while the part is being magnetized. A spray bulb or a powder blower which emits a low-velocity cloud applies the particles to the area being inspected. The particles line up in leakage fields to show the exact location and extent of the defects. Colors available are black, gray, and red. The dry method is recommended for rough surfaces and is most sensitive in locating subsurface defects. Excess powder may be removed by a low-velocity air stream *while the current is flowing.*

13. In the *wet method,* the particles are smaller and are furnished in a paste or in a powder which is mixed either with a light oil distillate such as refined kerosene or with water. The equipment used provides for agitation of the bath, which prevents settling. The inspection medium may be applied by hose, or parts may be immersed in the suspension. Colors available are black and red. The wet method is generally used on parts having relatively smooth surfaces, and it is somewhat more sensitive than the dry method for indicating very fine defects.

14. *Fluorescent magnetic particle inspection** employs particles coated with a dye which fluoresces brilliantly under ultraviolet (3650 Angstrom units) black light. Thus an inspector viewing a part under black light in a shaded area can readily see the defects. This method of inspection is fast and positive. It is most sensitive for indicating extremely fine or very small discon-

*This method should not be confused with fluorescent penetrant inspection.

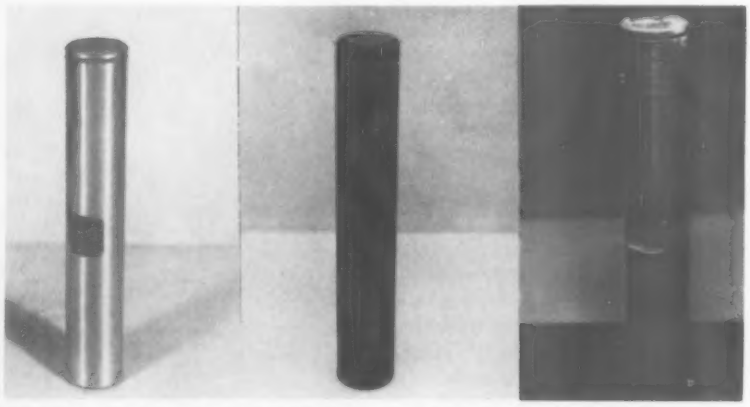


Figure 3. Grinding checks on king pin revealed through the use of fluorescent magnetic particle inspection. *Left:* visual appearance. *Center:* black particles. *Right:* fluorescent particles. (Courtesy Magnaflux Corp.)

tinuities. It is excellent also for the rapid inspection of irregular or dark surfaces.

15. The magnetic particle methods have extremely wide application to all types of ferromagnetic materials. From the ingot or casting to the completed part or assembly, these testing methods are used to help prevent the recurrence of objectionable discontinuities during manufacture and to reduce the time wasted in processing defective stock. During the service life of machinery or equipment, they are used to discover detrimental defects during regularly scheduled overhauls so that production losses and unnecessary hazards in operations can be reduced or eliminated. Typical applications are power generating equipment, boilers, crane hooks and lifting equipment, fork lifts, plant machinery and equipment, automobiles, trucks, buses, railroad equipment, and aircraft.

Penetrant Inspection Methods

16. Penetrant inspection methods are useful for revealing cracks, pores, leaks, and similar defects which are open to the surface in a metal or other solid material. First, the part to be inspected is cleaned. A penetrant is then applied to the surface and within a few minutes is drawn into defects by capillary action. The penetrant is removed from the surface but remains in the defects. A developer which acts like a blotter and brings the penetrant in the defects back to the surface is then applied, and the surface is inspected.

Figure 4. Fluorescent penetrant inspection of a fatigue crack in a forged aluminum piston. (Courtesy Magnaflux Corp.)

17. Depending upon the sensitivity of the material, the penetrant is removed by water wash, a solvent cleaner, or an emulsifier followed by water wash. Various penetrants and additives are available to meet sensitivity requirements.

18. The *fluorescent penetrant inspection method* produces vivid indications of defects under ultraviolet (3650 Angstrom units) black light. For detection of leaks, penetrant is applied to one side of an object, and the other side is inspected under black light. A portable kit with pressurized cans is often employed. Additives for water and other liquids may also be used for detection of leaks.

19. The advantages of this method are speed and sensitivity, particularly for nonmagnetic metals and solid materials. Its uses in maintenance and manufacturing include testing of critical or important nonmagnetic parts for aircraft, missiles, automobiles, trucks, buses, machinery, and chemical equipment.

20. In *dye penetrant inspection,* bright red lines or dots are produced on a white background. This method is recommended for occasional spot checks of a few parts or for testing of local areas on larger objects. The equipment is readily portable.

Filtered Particle Method

21. The filtered particle method is based on the fact that a liquid containing fine particles in suspension will be absorbed in unequal amounts by the various areas of a porous or cracked surface. When a part is dipped into this liquid or sprayed with it, particles are filtered out and concentrate on cracks or other flaws. Indications can be red, green, yellow, or fluorescent. This method is used on porous materials, such as carbon, brick, concrete, and sintered materials, and before repair of unfired clayware, such as high-tension insulators and sanitary ware.

Ultrasonic Methods

22. Ultrasonic waves (above the audible range of 20,000 cycles per second) have characteristics which make them useful for materials inspection. The simplest type of equipment sends a continuous stream of ultrasonic waves through the part to be inspected. These high-frequency sound waves are created by an electronic generator which supplies high-frequency AC voltage to a piezo-electric crystal.

Figure 5. Filtered particle fluorescent inspection of unfired insulators. (Courtesy Magnaflux Corp.)

23. Three basic ultrasonic methods have been developed: the reflection method, the through-transmission method, and the resonant-frequency method.

24. The *reflection method* utilizes the fact that ultrasonic waves are practically stopped when they hit the boundary between solid and air and are then reflected toward the point of origin. Therefore, that portion of the beam which strikes a flaw or discontinuity in the material will be reflected; the rest of the beam will go on.

25. The piezo-electric crystal transducer radiates these waves through a coupling medium into the material and also acts as a receiver to detect reflections, which are then picked up by an electronic amplifier and applied to a cathode ray oscilloscope on which the time intervals between the outgoing and the incoming waves can be measured.

26. A typical screen pattern will

Figure 6. Portable sonic equipment with camera attachment used to test the forks of lift trucks. Note the search unit is held near a defect which is being photographed. (Courtesy Delco-Remy Division, General Motors Corp.)

show two peaks, one representing the initial pulse and the other the pulse on the opposite side of the material. A discontinuity will result in a pip between the two peaks.

27. In the *through-transmission method,* a beam or wave is directed through a piece of material. Normal loss of energy is the difference between the energy entering one side of the material and that picked up on the other side. If a flaw or discontinuity is encountered, the energy is absorbed, and the beam or wave does not get through. The equipment consists of the following parts:

a. An electronic ultrasonic generator for creating a signal of 50 to 100 kilocycles (kc).
b. A piezo-electric crystal transducer which converts the electrical energy into mechanical energy, for transmission through the material.
c. A piezo-electric crystal transducer which serves as a receiver, picking up the mechanical energy and converting it into an electrical signal.
d. An electronic amplifier which increases the output of the receiving transducer.
e. An indicating device for signaling the presence of discontinuities.

28. In operation, the equipment is adjusted to give a range of frequencies critical for the type of material being tested so that the ultrasonic beams will be highly modified by discontinuities.

29. Since fluids such as water, oil, and glycerin give better coupling than air, they are generally used as the coupling medium between the transmitter, material, and receiver. In some applications, however, air or other gases can be used. The choice depends upon the material and upon whether or not it can be exposed to a particular coupling medium without damage.

30. This method has wide application in manufacturing processes which produce bonded materials, such as safety glass, tire plies, bonded metal strips, clad metals, and sandwich plastic materials.

31. The *resonant-frequency method* is used primarily to measure the thickness of material. The equipment consists of an electronic oscillator which supplies voltage of ultrasonic frequencies to a piezo-electric transducer. The transducer is pressed into contact with the part to be tested and induces longitudinal vibrations in the test piece under the area of contact. So that a wide range of thicknesses can be measured, these instruments have several frequency ranges, with corresponding scales and transducers.

32. One type of resonance instrument displays the thickness reading on a cathode ray tube as a pip on a calibrated scale. The location and, in many cases, the amplitude of the pip can also be used to detect laminar-like discontinuities, lack of bond, and other defects.

33. Another type of resonance instrument displays a number of pips as flashes of light in a logarithmic, stroboscopic pattern. When this pattern is matched with the lines on a circular slide rule attached to the instrument, the thickness is shown by means of a pointer. This instrument is readily portable and provides quick measurements of thickness.

34. Hand-tuned types using meter or audible read-out are also in use.

35. Resonant-frequency instruments are widely used to measure wall thicknesses, discover lack of bond on metal-bearing materials, and detect flaws parallel to the surface in sheet stock. A portable instrument is used to detect flaws across the webs of railroad rails, to obtain data for determining corrosion in paper mill, refinery, and chemical plant equipment, and to check over-all conditions and corrosion rates in other plant installations. These instruments also have been used successfully in the inspection and grading of grinding wheels, ceramics, metals, sintered metals, and plastics, and in refractories.

Triboelectric Method

36. The triboelectric method uses one of the oldest forms of electrical energy known to man and only recently adapted to the field of nondestructive testing. At the present time there are two instruments commercially available which utilize triboelectric energy.

37. One of these instruments employs a circuit which will detect minute quantities of current generated when two metallurgically or chemically unlike conductors are moved into frictional contact. If the conductors are alike, no current will be generated.

38. The equipment consists of a control unit and a portable sorting head connected by means of a cable. The sorting head contains all the main controls for actuating the test and is designed for one-handed operation.

39. This method is designed to sort and identify metal parts of not more than four alloy types. If more than four alloy types are present, it may be necessary to make two or more sorts, using as many selective test rods.

Figure 7. Triboelectric inspection of a lined chemical processing vessel, through the use of electrified particles sprayed from a gun. (Courtesy Magnaflux Corp.)

Charged Particle Method

40. The charged particle method employs a gun which induces a positive electrostatic charge on particles as they are blown from the nozzle onto the part being tested. As the positively charged particles are floated over the surface to be inspected, they are attracted and held by the negatively charged particles in the crack or backing material to form a visual indication of the defect.

41. For maximum contrast with the work, particles of various colors are available. Before this method is used on nonconductive materials, a special penetrant is applied and the part is dried. A penetrant is not required on nonconductive coatings with metal backing.

42. This method has proved highly satisfactory in testing glass-to-metal seals, bottles, glass-lined and certain plastic-lined process vessels, porcelain, enamel coatings, electrical insulators, dentures, plastics, etc.

Radiography

43. Radiography uses either X-rays or gamma rays. X-rays are unidirectional, and their wave lengths can be varied (within certain limits) to suit the condition.* Gamma radiography differs from X-ray radiography in that the gamma rays are multidirectional and their wave lengths, being characteristic of the source, cannot be regulated. Gamma rays for radiography usually are obtained from isotopes of cobalt-60, cesium-137, iridium-192.

44. Exposures made by gamma rays usually take longer to complete than do X-ray exposures. Also, in some instances, gamma exposures are inferior to X-ray exposures in sensitivity and contrast.

45. Gamma radiography, however, has several advantages. Because of the nature of isotopes, it frequently is possible to make a number of tests simultaneously, provided that specimens can be suitably located. Moreover, isotopes are independent of electrical power, their sources are portable, and the small size of the sources makes it possible to obtain radiographs in tight quarters.

46. Devices used to transform differences in intensity of the penetrating radiation into visible images are X-ray film fluorescent screens, geiger porportional end window scintillation counters, and ionization gauges.

47. Both X-rays and gamma rays are potentially dangerous and also may produce hazardous secondary radiation. In addition, X-ray units involve both low- and high-potential electrical hazards.

*See the National Safety Council's Data Sheet 475, *X-Rays in Industry*, for discussion of the subject.

Electromagnetic Methods

48. Two types of electromagnetic tests are currently being used in industry: magneto-inductive and eddy current. A third type, employing radar frequency, is also being used, but only to a limited extent.

49. The *magneto-inductive method* utilizes variations in the permeability of magnetic materials to create variations in a pick-up coil or probe. Primary and secondary windings are employed, and flux variations affect the phase and amplitude of the voltage induced in the secondary. Read-out is usually performed on a meter or an oscilloscope.

50. Two coils, each having a primary and a secondary, are often used together. One type of instrument has absolute coils. Here a sample of known characteristics is placed in one coil. Parts to be inspected are passed through the other coil. Single coils are also used with a bridge-type circuit, and variations in impedance provide the read-out. To determine material porperties, it is necessary to establish an unequivocal relationship between the variable of interest and the signals produced.

51. The second type of electromagnetic testing utilizes AC in a coil or probe to induce *eddy cur-*

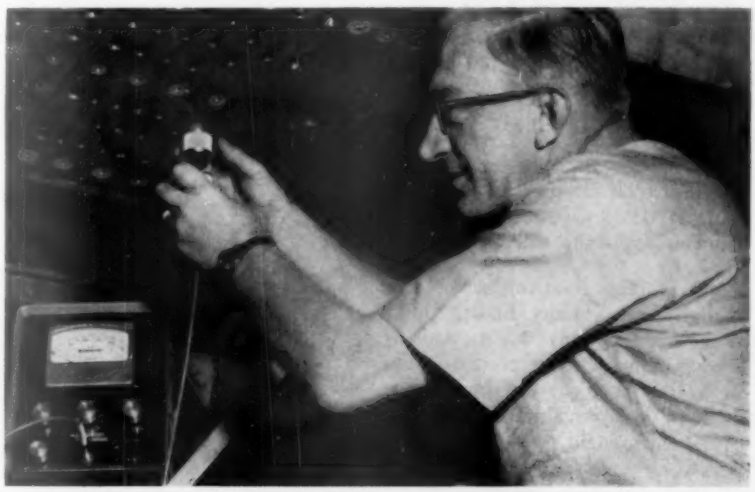


Figure 8. Locating cracks in "hard to get at" locations through the use of electro-magnetic testing with a probe. (Courtesy Magnaflux Corp.)

rent into the part being tested. Defects and variations in properties or geometry cause changes in the strength and distribution of the eddy current. These changes are reflected into the circuitry, where, generally, a bridge or comparator circuit is used to detect them. Read-out is presented on a cathode ray tube, on a meter, by audible or visible alarm, or by a combination of these methods. Auxiliary equipment can sort, mark, and perform other functions.

52. Through use of the optimum frequency and phase-sensitive networks, a great deal of discrimination can be obtained by means of eddy current testing. Instruments are available for many specific purposes, and laboratory installations are extremely versatile. To cite an example, one instrument with differential coils compares a section of tube or rod in one coil with that in the other. Defective areas can be marked at production rates of approximately 400 feet per minute.

53. These two electromagnetic methods have a wide variety of uses in detecting defects and testing for changes in chemical composition or physical shape. They are employed at the various stages of manufacture from raw stock to finished parts and also are used for preventive maintenance, to reduce both manufacturing and maintenance or replacement costs.

54. Materials tested include magnetic and nonmagnetic tubing, bars, rods wires, extrusions, forgings, stampings, castings, and finished parts, such as bearings and bearing races, piston pins, bolts, etc. For purposes of maintenance, these methods are used, for example, to locate fatigue cracks in contaminated or relatively inaccessible areas and to detect areas of corrosion from the opposite side.

55. Though relatively new, these methods are rapidly finding additional applications in monitoring during manufacturing processes and in testing parts in use for defects so that proper maintenance procedures can extend the useful life of parts and help prevent failures in service.

56. A third type of testing by electro-magnetic induction uses *radar techniques*. This method is new and has not yet been developed to the extent that equipment using it is commercially available to industry on a wide scale. At present, such equipment must be especially developed to suit specific industrial applications.

57. This method uses high-frequency radar waves to measure the electromagnetic properties of thin coatings and surface layers of material. To make such tests, a wave guide or cavity oscillator is coupled to the test object; high-frequency waves are then reflected from the object, providing an indication of the surface electrical resistance and of the thickness of the nonconducting coatings. Excellent results have been obtained in the testing of materials having extremely thin surface layers whose properties differ considerably from the properties of the underlying material.

Hazards and Safe Practices

58. A representative group of manufacturers of nondestructive testing equipment has expressed the unanimous opinion that, except in the field of radiography (discussed separately in this data sheet), hazards to personnel in the use of this equipment are no greater than those encountered in the operation of ordinary home appliances. Every effort is being made to eliminate hazards from such equipment during the planning and building stages. Nevertheless, it should be operated only by well-trained and qualified personnel.

59. *Electrical equipment*, whether stationary or portable, should have three-wire plugs and outlets, one wire being a ground, or be properly grounded in accordance with standard procedure.

60. When internal adjustments must be made or a cathode ray tube removed, the equipment should be disconnected from the power supply and the condensers discharged to prevent shock to the worker.* Bleeders in the power supply will help eliminate this problem.

61. *Health protection.* The incidence of dermatitis, which at one time was highly prevalent in nondestructive testing operations involving the use of liquids or pastes, has been greatly reduced through improvement of materials and techniques. Where older methods are still in use, standard precautions should be followed. Cleanliness should be stressed, and protective hand creams provided.

62. Where powder compounds are used in nondestructive tests and where the part is dipped into or sprayed with the dust particles, the area or equipment should be provided with either local exhaust or ventilation facilities or both. If such facilities cannot be provided, operators should be supplied with effective respiratory protective equipment. Eye protection should also be provided to guard against irritating effects of the powder.

63. During the early days of nondestructive testing, many compounds then in use were found to be highly toxic. Substitution of nontoxic materials and other refinements, which can be readily adapted for use with older systems, have greatly reduced this hazard. However, before a material is used, its toxicity should be determined. If the material is found to create a toxic environment more than the maximum acceptable concentration as specified by the American Conference of Governmental Industrial Hygienists, a substitute nontoxic material should be employed or effective control measures should be inaugurated.

64. *Burn hazards.* To prevent serious burns to the face or other exposed skin areas, excessive exposure to ultraviolet rays (black light) should be avoided. Such burns are similar to sunburn and should be treated in the same manner. Extreme exposure is highly dangerous. This hazard has been eliminated to a great extent through effective shielding of the equipment. If older equipment is used, the operator should be provided with No. 10 goggles* or equivalent.

65. Burns may also be incurred by operators of testing devices which

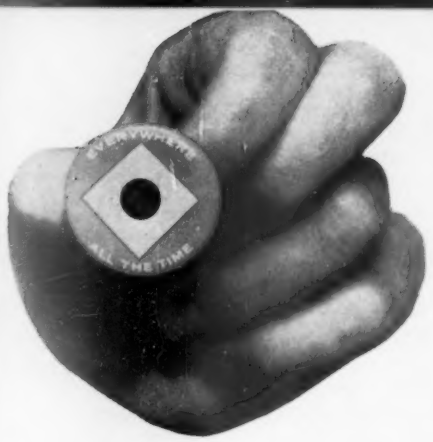
—*To page 116*

*Precautions for the handling and disposal of cathode ray tubes are outlined in the National Safety Council's Data Sheet 240.

*National Bureau of Standards Circular 471.

NOW!

SAFETY EVERYWHERE ALL THE TIME



SAFETY EVERYWHERE

No matter where on earth you go, a certain shaped bottle and the phrase, "the pause that refreshes," means but one thing—a popular American soft drink.

Advertising men have tried, with varying degrees of success, to attach slogans and symbols to products because they are aware of the tremendous power of the quick phrase, the easily-grasped symbol, in the mind of the buyer.

Those engaged in "selling" safety are faced with this problem, too. They need to keep their product before the worker's mind day in and day out.

For some time, many of the nation's key safety men have felt a great need for a slogan, a symbol, that would instantly mean safety to the worker. They wanted a recall device that would convey the idea of safety fast and often. And they wanted it to work both on and off the job so as to give the employee—and his family—24-hour protection.

On these pages is described a new all-encompassing safety program that brings safety home to the worker and his wife and children around the clock.

"WHAT gives with the button, Bill?"

"You'll find out, Jim. Just stick around."

That bit of conversation was overheard recently in the corridor of New York's Roosevelt Hotel. The speakers—two top-ranking safety men attending the January meeting of the National Safety Council's Industrial Conference.

The button Jim referred to was the lapel button shown at the top of this page. Bill, being on the "inside," knew that the button was the teaser opening of a new and different approach to all-round safety.

And Jim didn't have to wait long to get the facts on the new program. A feature of the Industrial Conference sessions was a showing of the motion picture, "Safety Everywhere—All the Time." The full-color film, designed as the kickoff feature for the program, embodies a dynamic new concept in safety campaigns.

The film tells the story of an industrial worker, his wife and their teen-age son and daughter. A near-tragedy happens involving the boy, a boat, and a pretty girl on water skis. Through this incident the family learns that safety is a family affair—something to be practiced everywhere, all the time.

At frequent intervals throughout the film, the viewer is reminded that safety is a round-the-clock job. The safety symbol—an adaptation of the yellow diamond found on highways and a universal symbol for caution and danger—fills the screen time after time. It becomes a continuing safety symbol for the program together with the theme, "Safety Everywhere—All the Time."

This entirely new accident prevention program was developed cooperatively by Allis-Chalmers Mfg. Co.,

In this final scene from "Safety Everywhere—All the Time," the film family decides that they will go all-out for safety.

Home safety scoreboard, available in National Safety Council program, reminds family to be safe. Mothers find it useful.

. . . ALL THE TIME

and the National Safety Council. Allis-Chalmers is planning to use it as the theme of its 1960 safety program. Recognizing the need for the promotion of such a campaign on a nationwide level, the Council expanded the program and made it an NSC service.

The motion picture, which will be available from the Council on a purchase or loan basis, was filmed in full color on actual industrial and off-the-job locations. Exciting boating and circus scenes enliven the soft-sell safety message.

Other material has been developed to go along with the film and keep the program constantly before the employee and his family for many months.

Easels for use on office desks or on tables in plant cafeterias, as well as the buttons described earlier, can be used as teasers to awaken interest in the program prior to the film showing. After seeing the film, they make excellent recall devices to maintain interest and provide workers with constant reminders of the program and safety.

Additional materials include special posters, leaflets, large banners for plant bays, scoreboards for displaying no-accident records. Also there are stickers for use on correspondence, pens, and key tags. All of these devices promote the easily identified symbol and easily remembered theme.

The idea behind the "Safety Everywhere—All the Time" program is to greatly broaden the approach to accident prevention. To make people genuinely safety conscious, it was felt that the on-the-job program needed to be supplemented and broadened into a total safety concept. This includes drawing the families of the employees into the accident prevention orbit—making safety a family effort.

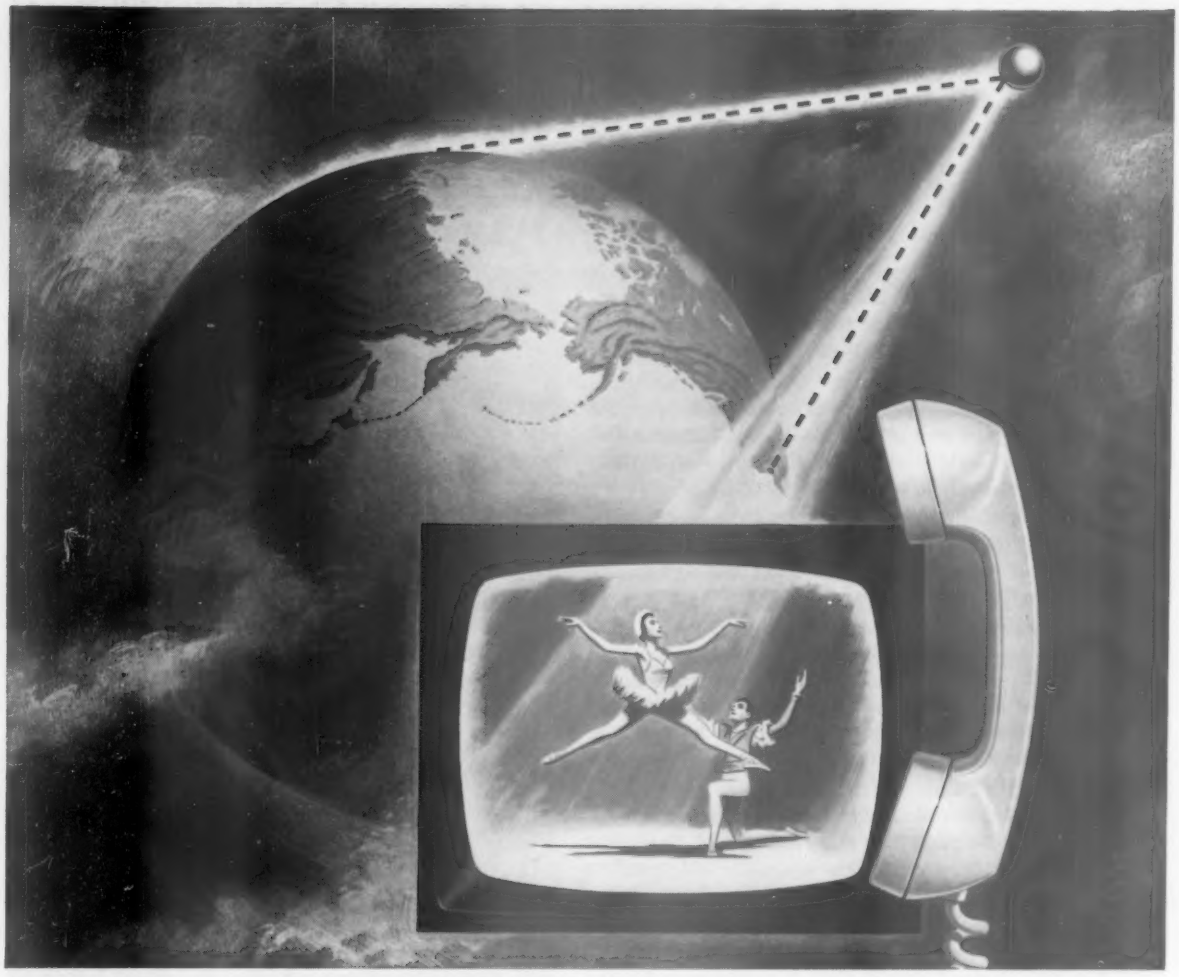
To help make safety a family affair, the program includes a new idea in home safety. In the movie, the mother, distressed at the near-loss of her son in an accident, decides to do something to remind the family constantly of the importance of doing things the safe way. She makes a safety scoreboard similar to those used in plants to tell workers how many days since the last disabling injury. One of the items in the Safety Everywhere—All the Time program is a home safety scoreboard with space for emergency telephone numbers, a handy message pad and—most important—a place to record the number of accident-free days for the family. It's a unique device to help make the family safety conscious.

Other methods to promote the safety campaign both at work and beyond the plant gate are being planned. Council publications will feature the Safety Everywhere —All the Time program throughout the year.

A young worker pauses at the water cooler and notes good housekeeping poster stressing campaign symbol and theme.

Everywhere—All the Time slogan and symbol gets added exposure when carried on table easels in plant cafeteria.

Durable pressed-wood scoreboards for plants can be spotted at strategic locations to keep employees up to date on record.



The high frequency radio waves that carry telephone and television signals travel in straight lines and refuse to follow the earth's curvature. To overcome this, it may well be practical and economical to send them over long distances by using earth satellites as relay points.

Telephone Calls and TV Shows by Way of Outer Space?

Under construction in foreground is a new antenna which Bell Telephone scientists hope will receive signals reflected from earth satellites during forthcoming tests. Background: a Project Echo transmitting antenna.

Maybe some day you'll get phone calls from Brisbane or Bombay—live TV from Caracas or Copenhagen—via satellites!

Over the years imaginative research has vastly improved your Bell Telephone service.

Now Bell scientists are looking ahead to an extraordinary possibility, until recently only dreamed of: the sending of telephone calls and TV across oceans via earth satellites.

To explore this idea, Bell Telephone Laboratories scientists are presently working hard on the communication phase of Project Echo. This experiment, sponsored by the National Aeronautics and Space Administration, seeks to reflect radio and voice signals across the U. S. by means of a 100-foot satellite.

Recently these scientists relayed a human voice from New Jersey to California via one familiar satellite, the moon, and also sent a signal several hundred miles by means of an aluminized balloon.

Many features of the telephone service we take for granted today once sounded as improbable as this. But working always on the frontier of science is one of the ways we make that service more convenient, economical and enjoyable for you.

BELL TELEPHONE SYSTEM

SECTION 1

PLANT DESIGN and CONSTRUCTION

IN SECTION 1:

Planning the Plant 19
Floors 20
Stairs, Ramps, Fixed Ladders 21
Lighting the Workplace 24

MAN can never escape his environment. Wherever he is, he is always a part of it. But he can make it safer by application of well known principles and methods.

Environmental hazards can to a great extent be controlled by designing and building plants for the people who work in them. Buildings, work facilities, and personal service facilities should be planned around the needs, capacities, and limitations of the individual.

Industrial engineering plans the efficient use of equipment and human skills without undue hazard or strain on the worker.

Preplanning an entire plant, remodeling buildings, and revising processes all offer opportunities for establishing a safe and hygienic workplace.

No slips, slides or skids with A. W. ALGRIP flooring. It's the world's *only* rolled steel abrasive floor plate, and an important aid to plant safety.

A. W. ALGRIP rolled steel floor plate is produced by Alan Wood Steel Company by a patented process in which an abrasive—just like the kind that is used in grinding wheels—is embedded to a specific depth. It becomes an integral part of a tough steel plate.

A. W. ALGRIP can be used as independent flooring . . . or as flooring overlay. Put your plant on a safe footing, with A. W. ALGRIP . . . Approved for Safety by Underwriters' Laboratories. Write for Bulletin AL-S1.

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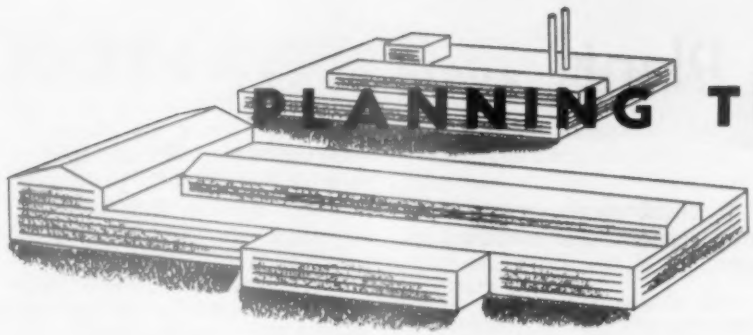

PLANNING THE PLANT

New construction and modernization offer unequalled opportunities for safety, hygiene and fire protection

EFFICIENT operation with maximum safety for the work force is the first consideration in planning an industrial plant. Fortunately the same measures will usually help in attaining both objectives—in building a new plant or modernizing an old one.

Modern standards call for ample work and storage space, good ventilation and lighting, efficient handling of materials, and provision for employee services. Most of the newer plants would get a good rating on these points but many an older plant could be improved. Whether to modernize or to move and build will be decided by economic considerations.

For new buildings or extensive modernization, a firm experienced in industrial construction can give valuable service. Its engineers are familiar with operating requirements and the various codes.

Plans, of course, should be approved by state and municipal authorities before construction starts.

Visualizing the finished job. A detailed flow sheet is a useful guide in laying out a plant, particularly where dangerous materials are used and where processes are complicated. Materials and processes in each stage of manufacture may be studied and provision made for hazard control.

Various methods are used to plan safe and efficient layout of production equipment. The single-dimension method spots the equipment and facilities on drawings. The two-dimensional method uses templets made to scale and fitted into a drawing of the floor area.

The clearest picture of the way a plant will operate with various arrangements of machines is obtained with three-dimensional models made to scale and set up on a scaled floor plan. These models may be made in the plant or purchased.

Selecting the site. First step is to check with local authorities on zoning regulations. A plant producing or using highly flammable or toxic substances or creating smoke, fumes, odors or excessive noise is sure to be barred from populated areas. Architecture, landscaping and effect on local traffic also influence location and public relations.

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Hazardous processes. Fire and explosion hazards demand isolation. Minimum distances between buildings of various types, sizes and occupancies are specified in fire protection codes. For flammable and explosive materials, minimum distances between storage areas and other property are specified.

Parking space is often a deciding factor in selecting the location of a plant or a shopping center. Parking lots should be adequate for employees and visitors, with separate entrances and exits. The lot should preferably be within the plant enclosure, but if separated from the work area by a busy thoroughfare or a railroad track, an underpass or bridge is desirable.

Efficient circulation of employees from parking lot through time clocks and lockers to work areas should be considered in plans.

Topography. A location where floods are a recurring threat is an undesirable industrial site. Where a plant is established in such an area, emergency plans for protecting life and property should be arranged on a neighborhood basis.

Climate. In colder regions, removal of ice and snow is a seasonal problem. Buildings must be built to withstand roof loads. Fire protection also requires special attention.

Covered storage of materials is often necessary in regions of severe cold or heavy rainfall.

Keeping building interiors warm while removing air contaminants may make ventilation complicated and expensive.

In hotter areas, heat and humidity, often increased by manufacturing processes, may cause fatigue, reduced output, and sometimes heat exhaustion. Air conditioning for comfort as well as for manufacturing processes may be justified by increased output and improved morale.

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Floors for the Plant

They must be safe, sanitary, durable

FLOORS receive 75 to 80 per cent of the frictional use of a building. In industrial buildings they are subject to traffic by hand and power trucks with hard, small wheels which can be as destructive to them as highway trucks are to roads. The heavier loads and higher speeds of the latter are offset by soft pneumatic tires.

Adequate structural strength is the first essential, particularly in multi-story buildings. Then the surface material must be selected for operating conditions. A poor choice of material or poor installation will result in a floor that will break up, crack or dust.

Get information. For a large installation, the company may call on a firm of engineers or architects or a reliable contractor. For the company which prefers to do the job itself, there is a wealth of information available. Much research on materials installation and maintenance has been conducted by government agencies, trade associations and independent laboratories. Nearly every type of flooring material has an association devoted to the product, and these can provide helpful information on materials, installation and use. Sources of information include:

National Bureau of Standards.

Associations—Asphalt Institute, Asphalt Tile Institute, Maple Flooring Manufacturers Assn., Portland Cement Association, and Tile Manufacturers Assn.

Helpful data are also available from manufacturers' catalogs and their service departments.

Planning the Work

When installing new floors or replacing old ones, this procedure is suggested:

1. Divide buildings into areas. List type of service in each.

Typical areas are: aisles, storage areas, heavy machine areas, loading docks, assembly areas, corridors, offices, rest rooms, lunchrooms and laboratories.

2. Check service requirements. How many of these conditions apply:

Size of area. What would the job cost?

Traffic. What is type and volume? Is it chiefly pedestrian or vehicle? Is resistance to slipping vital? What aisle widths and clearances will be needed?

Loads. What type of load—standing, impact, rolling, sliding, or vibrating? What will be maximum weight and concentration?

Water. Will floor be subjected to standing water, humidity, condensation, hot water, or steam?

Temperature. Will there be exposure to excessive heat or cold?

Weather. Is there exposure to strong sunlight, freezing temperatures, snow, ice or rain?

Fire and explosion hazards. Are there flammable dusts or vapors? Is an electrically-conductive, non-sparking floor indicated?

Chemicals. Will there be spills of solvents, acids, alkalis, or grease?

Product cleanliness. Do food processing or precision operations demand floors that can be sanitized?

Appearance. Is it a primary consideration?

Maintenance. Will the area demand vigorous cleaning?

Flooring Materials

There is no perfect material—one which will stand up under all exposures, be slip-resistant under all conditions, easy to maintain, also moderate in cost. Usually there must be a compromise.

Wood block floor with polyester blocks serving as permanent aisle markers. (Barrett Div., Allied Chemical & Dye Corp.)

Concrete comes the closest to being an all-purpose material. It is used for more than 75 per cent of industrial flooring. It is the most serviceable for most damp locations.

Where concrete floors have failed to give satisfactory service, the fault may be due to installation methods. Many maintenance problems can be avoided by proper curing, hardening and sealing. Continuous damp curing, particularly in the earlier stages of hardening, helps to secure a hard, dense surface and retards checking and dusting.

Hardening compounds and sealers help to prevent dusting, but no surface treatment can make perfect wearing surfaces of poorly built floors.

For repairing holes and cracks, some proprietary compounds are superior to concrete. However, the patch should be thick enough to stand up under heavy traffic. A feather edge is not durable.

For painting, floor enamels prepared especially for concrete are more durable than general purpose enamels. New concrete should be treated with zinc sulfate solution before painting to neutralize alkalinity.

Concrete provides a good substantial base for resilient flooring.

With all its merits, concrete is not resistant to some destructive agents, including acids and alkalis. Where floors are usually damp or are cleaned by flushing, the surface should be graded and drains installed.

Resilient non-slip mats are an aid to comfort where employees must stand in one position for long periods. Those who move about while at work are less likely to complain about floors being cold or hard. Footwear also has a bearing on comfort.

Asphalt (hot mastic) is non-dusting, elastic, odorless, and easily repaired. Problems of application restrict its use indoors.

Asphalt is resistant to weather and moisture but is affected by oils, solvents, acids, and alkalis. It stands up well under traffic but ordinary grades soften at temperatures above 95 F.

Harder grades of asphalt remain firm up to 158 F. With siliceous aggregate, the mix is resistant to acid.

Asphalt emulsion (cold mix), sold under various trade names, is made into a mortar with sand and cement, and laid about ½-in. thick. It is used extensively for patching. On a substantial wood base it will carry moderate traffic; with a concrete base it will take heavy trucking. The surface is somewhat harder than the hot mastic type. Both types are affected by oils, solvents, and heat.

Mastic flooring of other types usually has a resin binder. The materials are generally resistant to oils, solvents, and alkalis, but the manufacturers should be consulted about the exposure. These materials are relatively high in price and are used principally for patching and for resurfacing limited areas.

Ceramic glazed tile is frequently used where oils, acids, or alkalis are present and in food product plants where floors must be washed frequently.

Asphalt tile is suitable for offices, stores, light manufacturing areas, and floors below grade. Several grades are available: industrial, standard, greaseproof, conductive, and greaseproof-conductive. It is moisture resistant but susceptible to indentation. It should be laid over a rigid base.

Asphalt tile is lower in price than other resilient flooring materials. It is non-slippery in its normal state and can be kept in good condition with slip-resistant floor finishes. Solvent waxes cause deterioration.

Linoleum is quiet and comfortable underfoot. It is used in offices, laboratories, and workrooms where cleanliness and appearance are important. Heavy gauge linoleum will withstand loads up to 75 psi. without permanent marking. Since highly polished linoleum is extremely slippery, the choice of a finish is important.

Rubber is resilient and durable when not exposed to oils and solvents. It has high dielectric strength which is undesirable where static electricity is a problem. Conductive types of rubber flooring are suitable for such locations. Abrasive rubber

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Stairs, Ramps, Fixed Ladders

OPERATIONS normally conducted on more than one level require permanent access structures. These may be stairs, ramps, or fixed ladders.

The choice is determined by local conditions, including space available and nature of traffic.

Stairs are used for grades between 20 and 50 degrees from the horizontal.

Ramps are used where space permits and where there is considerable wheeled traffic. They should slope as little as possible; 15 degrees should be the maximum.

Fixed ladders are for grades over 50 degrees. They should be installed only where there is not enough space for stairs or ramps.

Stairs

Avoid long stair flights. Landings every tenth or twelfth tread are recommended.

For grades between 7 and 20 degrees, a combination of stairs and level landings may be used.

Spiral stairways are installed where there is not enough space for conventional stairways. Either type can be installed by plant personnel from standardized parts obtainable with a variety of slip-resistant treads.

Provide adequate light for stairways. Replace burned-out lamps promptly.

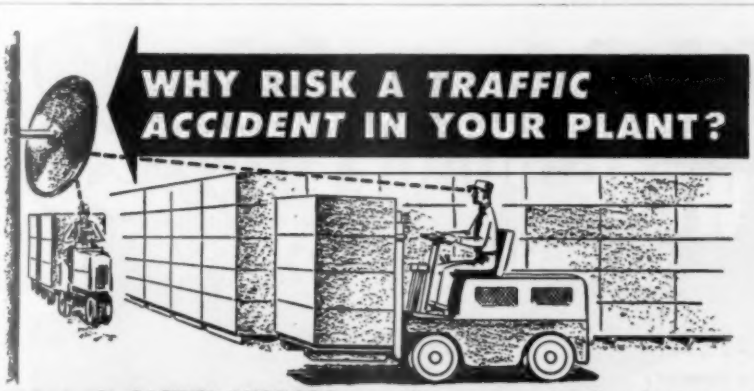
Angle of stairs. Ratio between depth of stair treads and height of risers determines the angle or pitch of the stairs, which should be between 30 and 35 degrees from the horizontal.

Tread width and riser height must be constant for each flight.

Winders should be avoided if possible. Wedge-shaped treads make it more difficult to ascend or descend safely.

Treads must be wide enough that, in descending the stairs, the ball of the foot does not project beyond the nosing and the heel does not strike against the riser above.

Building Exits Code, A9.1, speci-



KLEAR-VU SAFETY MIRRORS are the answer to the dangerous blind corner problem in your plant or warehouse. They are also adaptable for outdoor use in your parking lot, loading dock area or other points where traffic converges.

Mounted at cross aisle intersections, entrances and exits at a height of 8 to 10 feet, Klear-Vu Safety Mirrors clearly reflect oncoming intersection traffic to both power truck operators and pedestrians.

Style	No.	Dimensions
Circular Convex Glass	120	12" dia.
Circular Convex Glass	180	18" dia.
Circular Convex Glass	240	24" dia.
Circular Convex Glass	300M.R.	30" dia.
Circular Convex Glass	360M.R.	36" dia.
Flat Glass Rectangular	918	9"x18"
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M.R. indicates metal rim.

Available in either convex or flat glass styles, the mirrors are easily installed and quickly adjustable to any desired angle.

Special sizes made to order. Polished flat metal mirrors available.

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fies that treads of new stairs shall not be less than 9½ in. exclusive of nosing; also that no tread of less than 6 in., exclusive of nosing, shall be permitted.

Stairs subjected to severe use should have treads with a durable non-slip surface. Materials used for original installation or repairs include:

Concrete
Abrasive metal
Steel with extruded patterns
Grating
Plastic compounds
Rubber and fabric with abrasive surface.

Risers should not be more than 8 in. nor less than 5 in. in height. Greater or less height will cause an unnatural stride which may result in a serious fall.

Railings and handrails. ASA Code *Floor and Wall Openings, Railings and Toe Boards, A-12,* requires that every fllight of stairs having 4 or more risers shall be equipped with standard stair railings or standard handrail as specified.

Ramps

Ramps facilitate wheeled traffic between levels. For foot traffic they are preferable to stairways when practicable. They should be built to the least slope possible. Maximum recommended slope is 15 degrees. A rise of more than 1 ft. in 10 is prohibited by some state codes.

For wood ramps, materials used in construction should meet the requirements for scaffolds. Width should be adequate for traffic and open sides should be protected with standard railings 42 in. high.

Toe boards should be installed where the ramp extends over a work place or passageway. Cleats 16 in. apart are needed on steep inclines.

Planks should not overlap. The length of the plank should run the long ways of the ramp. Ramps used for wheelbarrows should have an odd number of planks with no cleats on the center plank. Width should not be less than 3 ft.

Concrete is recommended for heavy traffic. Anti-slip surface is obtained by rough floating or incorporated in the finish coat. Hardeners and troweling should be avoided.

Grating with roughened twisted bars provides slip-resistant self-cleaning surface for platforms and stair treads. There is no buildup of ice and snow. (Blaw Knox)

Concrete that has worn smooth can be roughened by scrubbing with dilute nitric or muriatic acid. The surface is then hosed to remove all traces of acid.

Ramps used by heavy vehicles, such as power trucks and heavy-duty hand trucks, should have solid curbs as well as handrails.

Ramps included as part of aisles or traffic routes should be as wide as the aisle to avoid bottlenecks.

Snow removal. Outdoor ramps and platforms should be kept clear of snow and ice in winter. If ice cannot be removed immediately sand or cinders may be applied to give traction. In cold climates radiant heating installed in the concrete is often a good investment.

Fixed Ladders

Fixed ladders should have parallel sides of wood or metal, and should be permanently fastened at top, bottom, and intermediate locations. If 20 ft. or longer, the ladder should be provided with cage or basket guard.

Fixed ladders over 30 ft. long should be built in zigzag sections, unless cages are used, and should be provided with platforms at intervals of not more than 20 ft.

Side rails should be carried 3½ ft. higher and preferably goose-necked. Openings more than 18 in. between the ladder and the working platform should be protected by a landing platform. ***

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• Top quality ¼ inch heavy duty live rubber
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Exclusive! Wear-Proof mats feature patented "V" rib design. Dirt is scraped off shoes by heavy duty blades with "windshield wiper" action — Dirt falls into slots, easily cleaned out later.
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Circle Item No. 4—Reader Service Card

Lighting the Workplace

Light to DO—Not Just SEE

GOOD LIGHTING is part of every industrial interior. It could also be classed as a production tool and an aid to safety. It permits operation around the clock without reduction in efficiency or increase in hazard.

Modern artificial light sources and lighting equipment, more uniform and dependable than sunlight, have made our industrial civilization possible.

What is good lighting? If the eye is to function effectively, the installation must:

1. Provide adequate light at the work surface. The worker must see easily and accurately.
2. Minimize contrast, glare and shadows.
3. Supply light of suitable quality for quick and accurate judging of details.
4. Contribute to a pleasing working environment.

Surface reflectances. To aid peak lighting efficiency and provide maximum diffusion of light, light colors should be used on ceilings and upper walls. Shiny surfaces should be oriented to avoid reflected glare.

Seeing zones. Two zones in the work room must be considered in providing light.

The task zone is the job and its immediate surroundings. Work should be lighted adequately, shadows eliminated or diffused, and reflections from surrounding surfaces avoided.

The other zone is the rest of the room. A person looking up from work should not face glare from lighting fixtures or have to adapt to dark or glaring walls. Adapting eyes from light to darkness several hundred times a day is fatiguing.

If the surrounding area has a brightness at least one-third that of the task, visual conditions are reasonably good.

Glare can be reduced by higher illumination levels throughout the room, also by finishing ceilings, walls, floors, and machines in light colors which reflect a high percentage of light. This reduces contrast between adjoining surfaces.

Directional and shadow effects are often desirable in general lighting. They accentuate the depth and form of solid objects. Clearly defined shadows are helpful in some operations, such as textile inspection. Harsh contrasts should be avoided.

—To page 24

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(See also Color, Section 2)

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• Reduce traffic accidents at blind corners inside and outside your plant —also at loading platforms.
Traffic Safety Mirrors are available in Convex or Flat glass. All have a Yellow and Black Safety Stripe Border.
Round Convex Mirror Sizes
13" • 18" • 26" • 36"
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6"x14" 14"x18"
other special sizes to order
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Millions of tiny, sharp, abrasive particles in Ferrox provide safe non-slip footing on all surfaces, wet or dry. Resists oil, chemicals, water and weather conditions. Adheres firmly to wood, concrete and metal. One gallon covers approximately 35 square feet. • **Write for Ferrox Bulletin.** AB-197

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Circle Item No. 6—Reader Service Card

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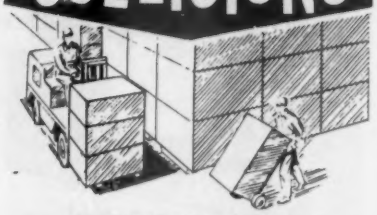

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36" See-All Reflector

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36" reflector equivalent to viewing area of 144 sq. ft. of flat mirror. Easily installed—completely adjustable. Mirror, stand, brackets and all necessary hardware included with each unit. *Write for low prices today.*

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Quickly and Easily Installed by Anyone—No Tools Needed!

- Simply slip GETS-A-LITE GUARD AND GUIDE over the fixture, as illustrated.
- Made of indestructible spring steel wire. Nothing to break, get out of order or replace. Will last indefinitely.
- Once installed, GETS-A-LITE GUARD AND GUIDE is NEVER removed.
- Nothing to unlock, fuss with or lock, when changing lamps.
- GETS-A-LITE GUARD AND GUIDE actually steers lamp into socket enabling maintenance man to change lamp in 10 seconds!
- Available for 40 watt and 100 watt fluorescent lamps.

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3865 N. Milwaukee Ave., Chicago 41, Ill.

Light levels for every type of operation will be found in many reference books. The most comprehensive work is the *IES Lighting Handbook*. Much useful information will also be found in manuals published by manufacturers of lighting equipment.

Existing levels are determined from readings with a light meter at points where light is needed. This device gives a direct reading in footcandles.

General lighting is the minimum amount of light required for an area. This has been defined as uniform distribution of light to produce approximately equivalent seeing conditions throughout an interior.

Localized general lighting sources are usually arranged 10 ft. or more above the work. They should prevent excessive contrast in brightness between the more highly lighted work area and the adjacent areas, and provide sufficient light for ordinary visual needs.

For general overhead lighting, levels range from 5 fc. for inactive storage and passageways to 1000 fc. for more exacting work, such as extra fine assembly.

Levels of 200 fc. or more are obtained with a combination of general lighting plus specialized supplementary and/or large luminous area lighting.

Extra footcandles. To insure continued adequate levels, the system should be designed to give initially at least 25 per cent more light than the recommended minimum.

Where dirt collects rapidly and maintenance is difficult, the initial value should be 50 per cent above the minimum.

Supplementary lighting. Difficult seeing tasks require more light than can be obtained economically by overhead general lighting. For such work supplementary fixtures are used.

Two types of equipment meet most needs. One uses small concentrating projectors to increase the light on the work and provide directional quality.

Another type has large area with low brightness, such as fluorescent desk or bench lamps. These fixtures can provide either general lighting for a small area or extra light for critical work, such as inspection.

REFLECTANCE VALUES

	Reflectance Factor (%)
Ceilings	80
Walls	60
Desks and bench tops	35
Machines and equipment	25 to 30
Floor (not less than)	15

Supplementary lamps should be shielded, louvered, or mounted to prevent glare.

Electric Light Sources

Three major light sources are fluorescent, mercury vapor, and incandescent. They frequently are combined to meet special lighting situations.

Fluorescent lighting is used for general lighting in 90 per cent of industrial applications at low and medium heights, also for high-bay mounting over large areas.

Mercury vapor lighting is largely used for medium to high-bay lighting in comparatively narrow room areas.

Incandescent lighting, with appropriate fixtures, may be used at any mounting height.

Fluorescent and incandescent lamps are used for supplementary bench and machine lighting.

Comparative efficiency. The fluorescent lamp, generally speaking, provides more than 3 times the light per watt of an incandescent lamp. It lasts approximately 7 times as long.

The mercury vapor lamp produces more than 2½ times the light per watt of an incandescent bulb and lasts more than 5 times as long.

An incandescent lamp can be used with any standard socket. Fluorescent and mercury vapor lamps need auxiliary ballast equipment.

Fluorescent lamps excel in both efficiency and quality of light. The long, luminous tubes diffuse light over a wider area, make for more comfortable seeing and reduce glare and shadows to a minimum.

The fluorescent lamp produces three times the visible light but only half the radiant heat of the incandescent lamp. This cooler light helps reduce the cost of air conditioning.

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SECTION 2

HOUSEKEEPING and MAINTENANCE

IN SECTION 2:

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Put Color to Work 29
Portable Ladders 32
Scaffolds 38
Floor Maintenance 44

INDUSTRIAL MAINTENANCE covers a wide range of activities which pay off in conservation of life, health, and property. It controls many causes of accidents, fires, wasted time, spoiled materials, and occupational diseases.

Good maintenance is indicated by clearly marked and uncluttered aisles, floors free from litter and grime, orderly storage, freshly painted surfaces, and equipment kept clean and in efficient operating condition.

Attaining these objectives requires organization, training, and supervision, also equipment and supplies. Back of an effective program there must be a realization by management that maintenance is not an unproductive side line.

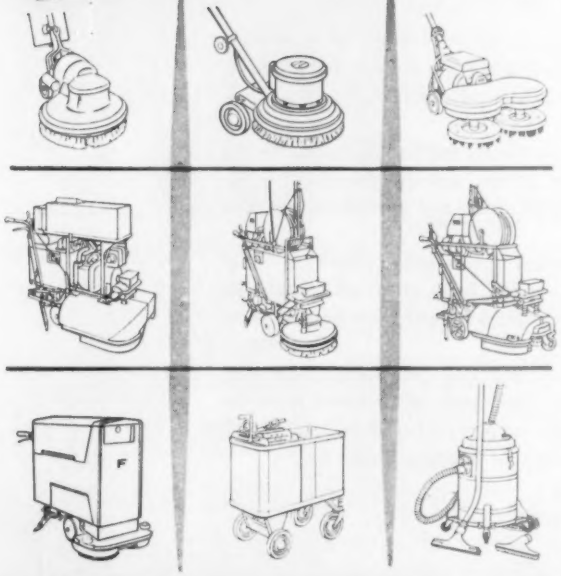
While the maintenance force is protecting plant and personnel, its members also need protection. Their work often takes them to out-of-the-way places, requiring safe ladders and scaffolds and many items of personal protection described in Sections 5 and 6.

Keep your floor-maintenance men happy . . .

with Job-Fitted EQUIPMENT!

Choose from the COMPLETE Finnell Line

More than a score of models and sizes permits selection of the equipment that's exactly right for your job!



However much a maintenance man may want to do a good job, and at the same time show savings in labor costs, he's *stymied* if the machine is too small, or too large, or is otherwise unsuited to the job. Different floors and areas call for different care and equipment. That's why *Finnell makes more than a score of floor-maintenance machines.* From this complete line, it is possible to choose equipment that is correct in size as well as model . . . that provides the maximum brush coverage consistent with the area and arrangement of the floors.

Finnell offers *Conventional Polishing-Scrubbing Machines* in both concentrated and divided-weight types, each in a full range of sizes . . . a *Dry-Scrubber,* with self-sharpening brushes, for cleaning grease-caked floors . . . *Combination Scrubber-Vac Machines* for small, vast, and intermediate operations, including self-powered (gasoline, propane, and battery) as well as electric models . . . *Mop Trucks* . . . a full line of *Wet and Dry Vacuum Cleaners, Attachments,* and *Accessories.* In addition, *Finnell* offers *Cleansers, Sealers,* and *Waxes* of every requisite type . . . *Steel-Wool Pads* and other accessories—*everything for floor care!*

In keeping with the *Finnell* policy of rendering an individualized service, *Finnell maintains a nation-wide staff of floor specialists and engineers. There's a Finnell man near you* to help solve your particular floor-maintenance problems . . . to train your operators in the proper use of *Finnell Job-Fitted Equipment and Supplies* . . . and to make periodic check-ups. For consultation, demonstration, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2203 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

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Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

Sanitation Maintenance

For safe and hygienic working conditions

EVERY work place has to be kept clean, in order, and safe; otherwise, workers are handicapped, and performance is impaired. Sanitation is more than housekeeping—it is the application of principles of sanitation to a multitude of tasks which sustain the total industrial or service environment. It covers the entire premises, inside and outside, and if properly done, its benefits extend into the homes of employees and to the entire community.

Sanitation maintenance, more properly termed industrial sanitation, is a concern of management, supervision, and employees, sometimes of outside agencies, such as health, fire, safety, etc. But it will rarely be satisfactory in performance if left a general responsibility of all concerned. It is only when sanitation maintenance is centered as a major duty of an individual in management or supervision that it stands a chance of being well and consistently done.

Industrial sanitation needs time, study, acquired experience and planning applied to it by responsible supervision; otherwise, labor and materials are wasted, production is impaired, and employees are unhappy and perhaps endangered.

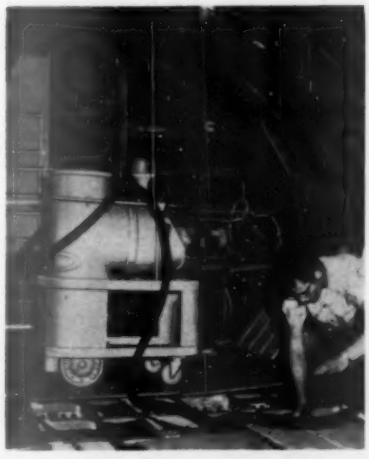
Maintaining high standards of industrial environment involves the following tasks:*

1. Structural cleaning.
2. Floor maintenance.
3. Maintenance of personal service facilities—washrooms, lockers, lounges, food service.
4. Machine and equipment cleaning, both in place and in special stations and facilities.
5. Insect and rodent control.
6. Collection and disposal of refuse and product wastes.
7. Operation of laundry and uniform services, also sanitation stockroom and supplies.
8. Protection of raw materials and finished products against damage and deterioration.
9. Supervision of plant security personnel.
10. Care of exterior areas—parking lots, roadways, walks, landscaping.
11. Maintenance of safe working conditions.
12. Maintenance of individual hygiene facilities.
13. Over-all sanitary supervision.

*From *Building and Equipment Sanitation Maintenance*, by J. Lloyd Barron and Albert J. Burner. Published by Association of American Soap and Glycerine Producers, 242 Madison Ave., New York.

Plant Design and Layout. Good design and construction mean that a plant can be kept clean, orderly and free from hazard with much less time, effort, and expense. These are characteristics of the modern plant:

1. *Aisles:* Wide enough for movement of traffic, with floor lines marking off work stations and storage areas.
2. *Space:* Sufficient room for the individual to work.
3. *Storage:* Adequate and convenient for materials and tools.
4. *Materials handling:* Layout planned for material flow; efficient equipment and methods.
5. *Ventilation:* Good general ventilation, plus local exhaust ventilation to remove air contaminants at source.
6. *Floors and walls:* Of construction and materials easy to keep clean.



Heavy duty vacuum cleaner removes stray nuts, bolts, and rivets as well as dust from planes during construction. Stray metal might work its way into air ducts damaging turbine blades.

7. *Lighting:* Ample, well-distributed artificial light; effective use of available daylight.
8. *Personal service facilities:* Up-to-date, well-ventilated washrooms with off-the-floor fixtures for easy cleaning. Locker rooms with ventilated, sloped-top clothing cabinets built flush on concrete bases for easy maintenance. Clean, light, airy, and inviting in-feeding facilities, with well-designed food-handling and serving equipment of sanitary polished metal and plastic.
9. *Waste removal:* Adequate facilities to prevent congestion and disorder.

Organization. Back of every effective maintenance program is an enlightened management. Carrying out the program requires a well-supervised crew of able-bodied intelligent employees, trained in their duties and provided with modern cleaning equipment and supplies.

A manual of standard procedures is helpful in training and supervising the maintenance force. The manual may consist of a few typewritten sheets or a sizeable volume, depending on the size of the plant and the complexity of maintenance problems.

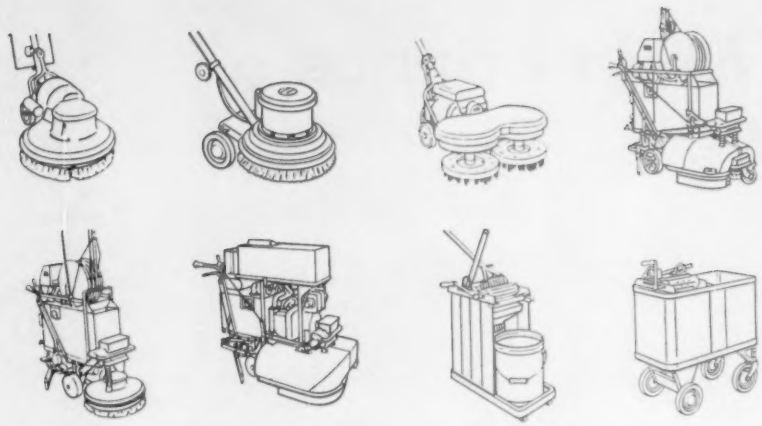
Women are often employed for lighter duties, such as office cleaning and routine care of women's washrooms.

Cleaning Equipment

Vacuum cleaners. Heavy-duty types are available in several models and capacities, with a variety of attachments. They are useful for removing dust from corners and overhead places, as well as for floor cleaning.

Central vacuum systems are often used where dust sources are close together and a large volume of dust must be removed. Cleaning implements are attached to inlets located at convenient intervals. Central systems are used to advantage for the removal of grain dust in buildings housing milling equipment, and in some hotels and office buildings.

For most industrial uses, portable cleaners are satisfactory, since



Floor machines of several types make short work of stubborn accumulations of dirt on large areas. Hand mopping is needed in some locations and proper accessories lighten the work of the cleanup crew. (Finnell Systems, Inc.)

dust sources are usually widely distributed. Portable cleaners are also used for wet pick-up—scrubbing solutions, spillage, etc.

Floor machines of several types handle heavy jobs of floor cleaning efficiently. With them, floors can be scrubbed, dry-cleaned, waxed, or polished. Attachments of various types increase the usefulness of floor machines.

Crusts of dirt, oil, and metal cuttings can be removed with revolving wire brushes much more quickly and thoroughly than by hand spudding.

For finer finishing, steel wool rolls can be used. A vacuum pick-up for collecting dust is essential for dry operations. Suction in connection with a scrubber damp-dries the floor quickly. Scrubbing, rinsing and drying can be done with a minimum of interruption to production.

Floor machines may be purchased or rented. Some manufacturers have service men who will train maintenance crews in cleaning methods.

Hand cleaning. Brooms, brushes, mops, etc., are needed to supplement mechanized cleaning equipment. Tools of good quality are more durable and encourage better work. For dry sweeping, treated sweeping cloths or treated cotton yarn mops are preferable to bristle or fiber push brooms which have a tendency to raise dust. Most large organizations patronize industrial laundries which furnish cleaned and treated floor mops and sweeping cloths.

Magnetic sweepers pick up iron and steel chips, filings, nails and tacks from floors, driveways and walks, where such material may cause fire, explosion, or personal injury. This type of sweeper has a rotary non-electric magnet, detached from the unit for removal of accumulated metal.

Larger power-driven models are used outdoors for sweeping large areas. These remove nuts, bolts, and other ferrous objects around hangars and roadways where they might be sucked into jet engines.

Aisle marking. Wide, clear aisles indicate a well-kept plant. White lines are constant reminders to keep them free from obstruction and to pile stock within designated areas. Lines can be renewed quickly and economically with an aisle-marking machine.

Plastic tape in white and colors is also used for marking aisles and storage areas. It is resistant to moisture and most chemicals. Lines can be changed and damaged parts replaced easily.

White is standard for highway traffic lines and is preferred for interior floor marking.

Trash containers at convenient locations help to keep litter off the floor. Containers with self-closing lids are best, particularly where oily rags and waste are deposited. Containers painted a distinctive color call attention to their presence.

Large containers (4 to 8 cu. yds.), equipped for automatic attachment and release from a disposal truck, may be located strategically on the plant grounds. The smaller containers are emptied into these by the housekeeping force.

Steam-cleaning units, which deliver jets of steam and cleaning solution under high pressure, are used to clean some types of processing and fabricating equipment and to remove stubborn deposits of dirt from floors, walls, and ceilings.

—*To page 42*

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Put Color to Work

It's a versatile aid to operation and safety

YOU CAN DO a lot with color. Used with understanding it can:

- Conserve light — improve visibility
- Encourage better housekeeping
- Spotlight point of operation on machines
- Increase visibility of barricades and moving vehicles
- Identify fire and accident prevention equipment
- Add punch to instruction and warning signs
- Create cheerful surroundings—restful or stimulating
- Make rooms seem larger or smaller, warmer or cooler

Through the medium of paint, near miracles can be accomplished at moderate expense. But to get the desired results it must be applied according to established scientific principles. Paint manufacturers and color experts have conducted considerable research on functional and decorative use of color, and help is readily available.

Psychological factors. Certain colors have been found to produce definite mental and emotional responses. Familiar colors and the reactions they arouse are:

Yellow—cheering, stimulating.

Blue—gives a feeling of coolness; helpful where temperatures are uncomfortably high.

Green—restful to the eyes; blue-green is cool; yellow-green is warmer.

Red—danger, excitement; traditionally associated with fire.

Orange—bright and warm; use with caution.

High visibility is important for moving vehicles, particularly indoors. Diagonal stripes of black and fluorescent yellow make this fork truck conspicuous. (Lawter Chemicals, Inc.)

Background Colors

The old plan of white for ceilings and upper walls with "practical" dark colors for dadoes and machines is being replaced by color schemes which provide more cheerful and attractive interiors. Paint companies and color consultants will be glad to furnish advice.

Sharp contrasts between bright and dark areas should be avoided. They require continual adjustment of the eyes in looking from one to the other, causing eyestrain and fatigue.

White is favored for ceilings; it reflects more light—80-88 per cent. But for rooms with low ceilings, or where people may look up at them, as in hospital rooms, cream, ivory, or sky blue is preferable to solid white.

For overhead networks of girders, pipes, and other equipment, colors of high reflectance also are desirable.

For sections of walls within the range of vision, soft tints, such as light gray, green, or blue, are suitable. Soft gray, for example, is restful and does not show dust readily.

A dado the height of work benches and machines—about one-third the height of the wall—makes soil and marks less conspicuous. It may be a deeper tone of the color of the upper wall but should not be too dark.

Floors should have a reflectance value of at least 25 per cent. For machines, benches, and desks, 25 to 40 per cent is suggested.

Point of Operation

To make it easier to see work and avoid injury, spotlight the point of operation with paint. Paint the body of the machine one color and working areas another.

Four standard shades of "machine gray" are available. Critical parts can stand out in cream, light tan, or other light contrasting color.

Light source and color. Type of light should be considered in planning the color scheme. Incandescent lamps reduce strength and intensity of color because the light has a slight yellowing effect.

Fluorescent lamps are offered in several types. The four most common are: standard warm white, standard cool white, de luxe warm type, and de luxe cool type. Cool white units give a bluish hue and can be used with blue, green, and blue-violet. Warm white is suitable for ivory, cream, beige, rose, and tan.

The de luxe lamps are used in plants where color discrimination is exacting, as for inspection, and in lounges, cafeterias, and display rooms.

Color for Identification

Safety codes for the use of standard colors for identification of equipment and hazards have been developed by the American Standards Association. *Safety Color Code for Marking Physical Hazards and the Identification of Certain Equipment Z53.1-1953* specifies uniform colors for marking physical hazards, for indicating the location of safety equipment and for identifying fire and other protective equipment.

Some chemical and petroleum

—*To page 42*

PAINT REFLECTION VALUES
(Per Cent)

White	88
Ivory	69
Cream	67
Sky blue	65
Pale green	59
Buff	52
Aluminum	41

These values are only approximate since colors vary with different paint manufacturers.

Lighting the Workplace

—*From page 24*

Mercury vapor gives a high volume of concentrated light per fixture. This makes it ideal for high-bay installation.

Long life is an important feature —averaging more than a year on typical two-shift operation. Mercury vapor provides a compact, controllable light source which performs well in all temperatures. It is simple to maintain and has a wide variety of applications.

The blue-white hue is adequate for the black, gray, and white seeing tasks of many industrial operations.

The basic color of the light can be modified by using color-improved mercury lamps or by combining with fluorescent or incandescent lighting.

The mercury-fluorescent combination is effective in medium-high bays which are easy to service and free from excessive dirt. Mercury should supply 60 to 80 per cent of the total light. Fluorescent will soften glaring contrasts.

In high bays twin units for mercury and incandescent can be installed. The mercury provides 50 to 65 per cent of the light. This combination is simple to maintain, offers little surface for dirt accumulation. It provides instant relighting after power interruption, when mercury lamps take 5-8 minutes to relight.

Incandescent lamps are low in initial cost. No auxiliary equipment is needed and an incandescent system is easy to install, maintain and relamp. However, lower efficiency makes over-all lighting cost higher.

Incandescent provides a "point" source of light. It can be controlled more easily but is more likely to produce glare and shadows. In industrial practice, incandescent is used largely for supplementary lighting with fluorescent fixtures supplying most of the general lighting.

Efficient operation requires frequent checking to prevent voltage variation. If circuit voltage is lower than rated lamp voltage, light output and watts decrease, though life lengthens. If voltage is higher, light output and watts increase but life is shortened.

Voltage variation should be held within 3 volts of rated lamp voltage for 110-125-v. lamps and within 6 volts for 220-250-v. lamps.

Reflectors. Many types of reflectors have been designed to conserve light and prevent glare. Consider these factors:

1. Distribution of light on the job.
2. Efficiency of light output.
3. Sturdiness of construction.
4. Adaptability if more light is needed.
5. Economy of cleaning and replacement.

Lamps with a reflecting surface inside the bulb are used where dust, fumes, and other conditions make maintenance difficult or costly. The reflecting surface is sealed against deterioration and light is diffused through the bottom of the lamp.

Reflectorized lamps are available in both filament and mercury vapor types.

Natural Light

A plant may be designed to make full use of daylight or to depend largely or wholly on artificial light. The problem is primarily one of economics, figuring the number of sunny days and in the increased cost of construction to bring daylight into the plant.

Sawtooth roofs, oriented to avoid direct sunlight, offer an effective way of daylighting a one-story building. Extra construction cost as compared with a flat roof, may amount to 20 per cent or more.

Side windows alone are unsatisfactory for lighting extensive areas.

Skylights are rather expensive to keep in repair and clean. In regions where hail storms are frequent, panes of acrylic plastic are more serviceable. These are made to transmit a maximum of diffused light and a minimum of heat.

Refracting and **diffusing** glass are helpful in subduing glare. They improve distribution of light, particularly to distant parts of the room.

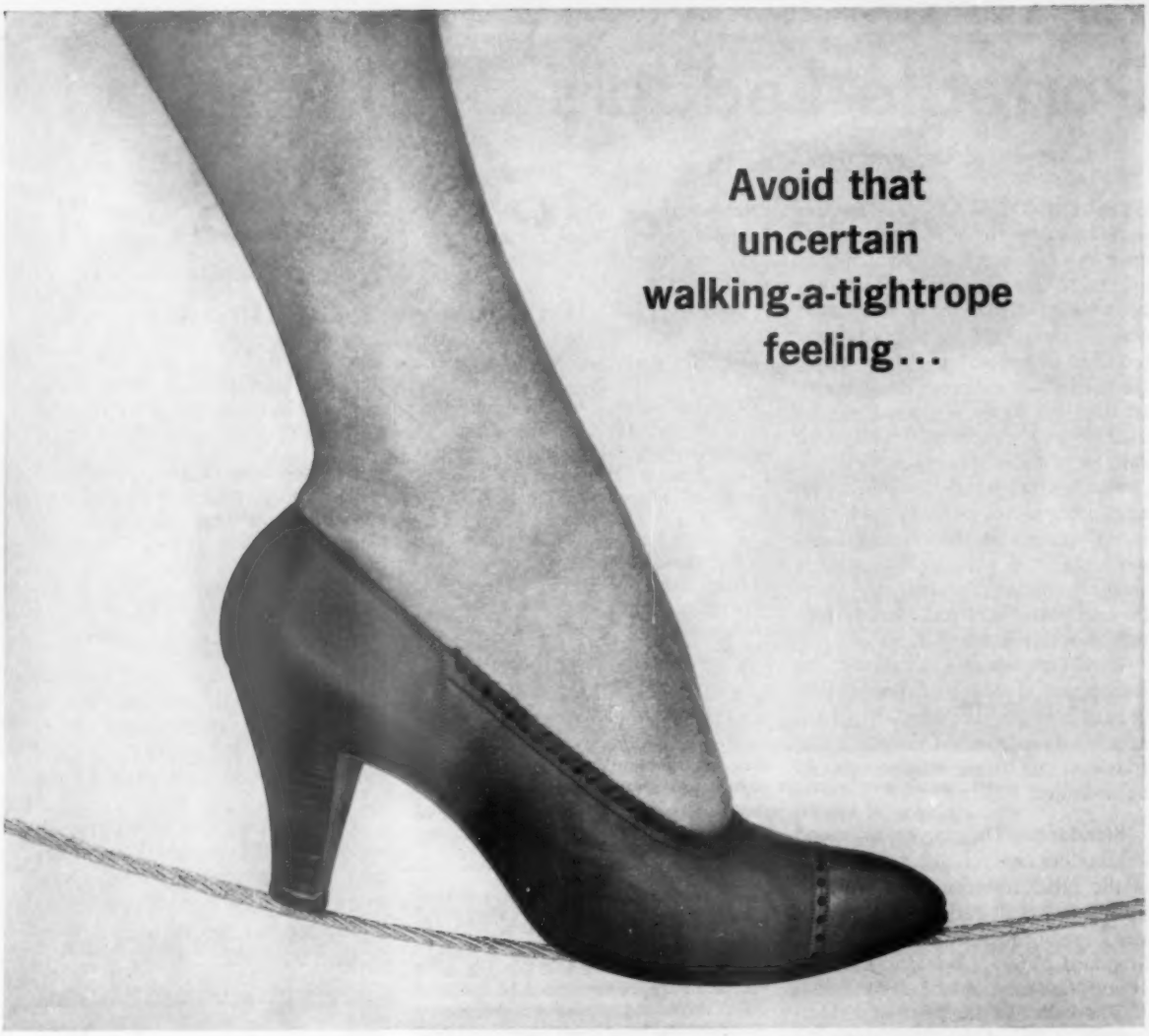
Translucent coatings for windows also help in reducing glare.

Reflection of daylight from sources outside a building can often be utilized. Light colors for faces of structures, walls of courts, and sawtooth roofs are helpful. These surfaces should be kept clean and free from sources of glare.

Sudden transition from bright to dim areas in a plant is hazardous. While the pupil of the eye is adjusting itself to the dimmer light, there is a period of semiblindness. Gradations of light at the approaches to areas of different intensity will avoid this trouble.

—*To page 125*

The grid system, with continuous rows of fluorescent fixtures running both ways, gives greater visual comfort by supplying light from all parts of the ceiling. Ceilings and upper walls in white conserve light. (Sylvania Electric Products, Inc.)



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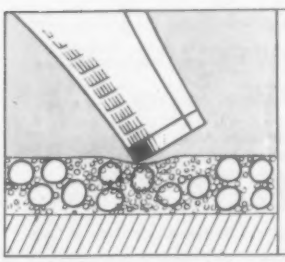

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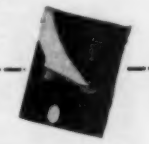

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Portable Ladders

Selection, Use and Care

EVERY INDUSTRY uses ladders —often many times a day. Considering the frequency with which they are used, the accident record has been good. Of the accidents that do occur, few result from faulty material or construction. More often, the ladder has suffered abuse, maintenance has been neglected, or the user hasn't observed well-known safe practices.

Even with sound equipment, an accident may occur when the ladder is not placed at the correct angle with the wall or is not planted securely on the ground or floor. Physical defects of the user are also responsible for many falls.

Portable ladders, it should be remembered, are for occasional jobs at scattered points. Where frequent access to any location is needed, stairways or fixed ladders should be installed.

Standards. The buyer of wood ladders has two reliable guides. One is the label indicating the product has been built according to the strict specifications of the American Standard *Safety Code for Portable Wood Ladders, A14.1-1959.*

The other is the label of Underwriters' Laboratories indicating the ladder has passed the Laboratories' rigorous tests.

Metal ladders are covered by American Standard *A14.2-1956.* Standards for aluminum and magnesium ladders had previously been established by the Metal Ladder Manufacturers' Association.

Painting short sections of ladders for identification is often desirable but transparent coatings are preferable for coating the whole ladder.

Definitions

Nine types of ladders commonly used in industry are defined in the American Standard Safety Code:

1. Stepladder. A self-supporting portable ladder, non-adjustable in length, having flat steps and a hinged back. Size is designated by over-all length of ladder measured along front edge of side rails.

2. Single ladder. A non-self-supporting portable ladder, non-adjustable in length, consisting of but one section. Size is designated by over-all length of side rail.

3. Extension ladder. A non-self-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Size is designated by sum of lengths of sections measured along side rails.

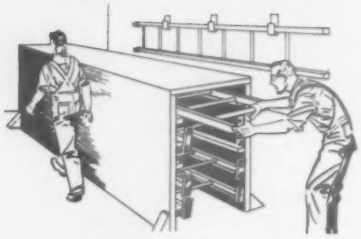
4. Sectional ladder. A non-self-supporting portable ladder, non-adjustable in length, consisting of two or more sections so constructed that the sections may be combined to function on a single ladder. Size is designated by over-all length of assembled sections.

5. Trestle ladder. A self-supporting portable ladder, non-adjustable in length, consisting of two sections hinged at the top to form equal angles with the base. Size is designated by length of side rails measured along front edge.

6. Extension trestle ladder. A self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable single ladder, with suitable means for locking the ladders together. Size is designated by length of trestle ladder base.

7. Special-purpose ladder. A portable ladder which represents either a modification or a combination of design or construction features in one of the general purpose types of ladders previously defined to adapt the ladder to special or specific uses.

8. Trolley ladder. A semi-fixed ladder non-adjustable in length, supported by attachments to an overhead track, the plane of the ladder being at right angles to the plane of motion.



Ladders in storage should not be exposed to excessive moisture or heat. Racks and wall hooks should provide ample support to prevent sagging.

9. Side-rolling ladder. A semi-fixed ladder, non-adjustable in length, supported by attachments to a guide rail, which is generally fastened to shelving, the plane of the ladder being also in its plane of motion.

Materials and Construction

Wood, which meets the requirements of weight and strength at moderate cost, is the most widely used material. Acceptable kinds and grades of wood are listed in the ASA Code.

Ladders may have either spreading or parallel straight lines. They may have sides flaring at the base to increase stability, and converging at the top for specific uses.

—*To page 35*

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● **Proper use of eye-rest** and focal colors provides better contrast between working parts and materials being fabricated. Operators see their jobs better and with less eye strain. Morale-building colors on walls and ceiling reduce glare from light sources and eliminate heavy shadows, creating more pleasing work areas. Warning and safety colors on machine controls, conveyors, motorized equipment, traffic lanes and cranes indicate hazard areas and reduce the danger of time-loss accidents.

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Portable Ladders

—*From page 32*

Laminated ladders. Side rails of laminated wood have high strength-weight ratio, are able to carry substantial loads after initial failure, and give distinctive sound warnings as failure progresses gradually.

Laminated ladders are available in single and two-section extension ladders and several specialized types.

Light metals. Aluminum and magnesium alloys are light in weight and resistant to moisture. In case of overload there is deflection warning instead of sudden breakage. Prices are higher than for wooden ladders.

Metal ladders should be free from sharp edges and burrs on the side rails. Soft metal rivets that might shear off under load should not be used.

Single or extension ladders, stepladders, platform ladders, and planks, stages and hangers are available in light metals.

Caution: Metal ladders are conductors of electricity and should not be used around electrical equipment. Decals or painted warnings against such use should be carried on all metal ladders.

Glass fiber and plastic. Single and extension lightweight ladders are now available in a sandwich construction of glass fiber and polyester resin. Advantages claimed are high strength-to-weight ratio, non-conducting qualities and resistance to corrosion. Glass fiber reinforced side rails are plastic welded with aluminum or magnesium rungs to form an integral part of the ladder.

Standard single ladders, 8-16 ft., and extension ladders, 16-28 ft., weigh approximately 2 lbs. per ft. Heavy-duty single ladders, 8-20 ft., weigh 2¼ lbs. per ft. and extension ladders 2½ lbs.

Types of Ladders

Stepladders are available in lengths up to 20 ft. Three types are listed by the Code:

1. Heavy duty—4 to 20 ft.
2. Medium duty—4 to 12 ft.
3. Light duty—3 to 8 ft.

More substantial construction is, of course, specified for the longer, heavier-duty ladders.

The front section should have level treads when in the open position.

The rung-back stepladder permits a helper to assist from the back of the ladder.

A spreader or locking device of sufficient size and strength to hold front and back sections securely in the open position is important.

A bucket shelf is useful for many jobs. It should support a load of 25 lbs. and be fastened so it can be folded up when the ladder is closed.

Platform (safety) ladders are a development of the stepladder. They provide a solid working platform guarded on three sides.

Safety ladders are usually built for heavier duty than the ordinary stepladder.

Height to platform ranges from 3 to 18 ft., over-all height being 2 ft. more.

Pyramid safety ladders, made of aluminum or steel, provide a secure, well-balanced platform for work at heights up to 15 ft. Rubber-tipped feet hold the ladder in place while work is done and casters permit easy movement.

Single ladders up to the maximum length of 30 ft. specified by the Code are available. For sizes larger than 24 ft., extension ladders are easier to store and transport.

Sectional size of rails varies with the length of the ladder and diameter of rungs increases with the width of the ladder between side rails.

Diameter of rungs should not be less than 1⅛ in. Holes for rungs may extend through the side rails or be bored to give at least 13/16 in. of bearing to the rung tenon.

Oilers' ladders are provided with hooks at the top so the ladder may be securely fastened to overhead shafting.

Extension ladders. Two-section extension ladders up to 60 ft. in length are recognized by the Code. Specifications for dimensions of side rails and type of wood permitted vary with the length of the ladder.

Minimum overlap for ladders up to 36 ft. is 3 ft.; from 37 to 48 ft.,

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WEST

4 ft.; from 49 to 60 ft., 5 ft.

Smaller side rails on rung-type ladders are acceptable when reinforced by steel wire running the length of the side rails and securely fastened to them.

Locks must be positive in action. Guide irons must be securely attached to the ladder and so placed as to prevent the upper section from tipping or falling out while raising, lowering, or in use.

Rope and pulley for raising and lowering, while not mandatory, are desirable.

Trestle ladders (A-type with center section which slides up and down) are used in maintenance work. These ladders are commonly used in pairs with a stage between them or in sets of four with two stages and with planks from stage to stage.

In selecting extension trestles, look for guides of adequate length, strong locks of the sliding section, and a safety spreader.

Telescoping ladders are mounted on rubber-tired ball-bearing wheels with floor locks. Maximum height of working platform is 15 ft. When down, they will go through an ordinary door or into an elevator.

Telescoping towers can be extended up to 49 ft. The man on the platform controls the travel through an electric push-button system. Another push-button control is located on the frame below, but the man above can lock the platform in place by pressing a safety button. Outriggers give stability.

Chain and rope ladders are for emergency use as a means of escape in case of fire or explosion, and for rescue work where rigid ladders cannot be used. These are not substitutes for permanent fire escapes.

Crow's nest ladders. For many outdoor maintenance jobs the "crow's nest" ladder mounted on a truck is used. It is an extension platform ladder, securely mounted on the vehicle, which can be rotated in a complete circle and elevated at angles from 45 to 72 degrees from the vertical.

This device permits working over parked vehicles and is used for tree trimming, servicing street lights, police and fire alarm signals, inspecting overhead lines, connecting house services, and general emergency work. It can be lowered for traveling.

Safety Accessories

Ladder shoes. Whenever a portable ladder is used on anything but dry ground, there is possibility of the feet slipping. To overcome this hazard, several types of ladder shoes have been devised. They grip the surface by sharp points or by friction.

One type of sharp point is the metal spike; another is the abrasive shoe. The friction type depends upon frictional resistance for the gripping qualities of cork, lead, and rubber or neoprene with interwoven cord.

Another type made of cotton asbestos material and interwoven wire combines the two principles. Suction cups are used in still another type.

Ladder shoes become less effective through wear, especially when exposed to oil and grease on the floor. Consequently, they should be inspected regularly.

—*To page 40*

We tried dozens of floor cleaners—Only Legge TEXINOL does the whole job!

We used to store a drum of this and a drum of that—. One Cleaner for asphalt tile, one for rubber, another for our marble floors.

Sometimes our crews would grab the wrong drum from our crowded storeroom. Then we *really* had trouble. Now we use TEXINOL for everything. It does an outstanding job. It's easy to work with, both for routine maintenance and for stripping. Saves us money, too, because a little goes a long way.

NEEDS NO RINSING

TEXINOL is an all purpose, commercially neutral Pine Oil Cleaner in either concentrated jelly or liquid form. Safe on all surfaces, rigid and resilient, where water can be used. Leaves no soapy film, needs no rinsing except when floors are stripped. Certified by Detroit Testing Laboratories and other independent Researchers.

Use TEXINOL to clean metal cabinets, tile walls, lavatories, showers, painted surfaces. Also recommended for use on all types of conductive flooring. Mail the coupon today for full facts on TEXINOL, the one Cleaner that serves all your needs.

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Complete scaffolding and ladder equipment and engineering service offered through nation-wide sales offices or representatives. Look under Patent Scaffolding in the Yellow Pages for your nearest source

"GOLD MEDAL"®
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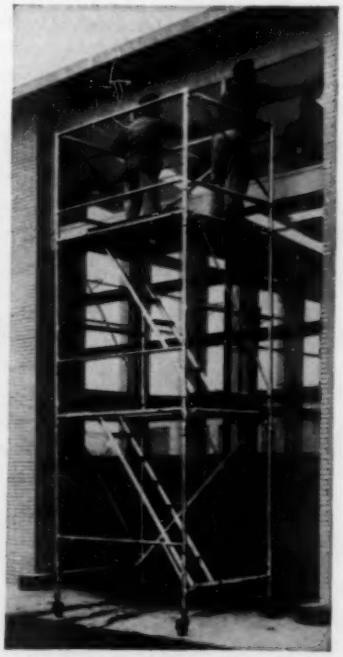
This is the safest step ladder made. If the "Gold Medal" Safety Platform Step Ladder does not cut the number of accidents in your building from falls, dropping tools, etc., then no ladder will. All pivot points are metal to metal, which reinforces all connections and eliminates chafing of wood. The broad working platform permits men to work in any direction—safely—with both hands free. Heavy rung back construction permits use by helpers. Yet, it handles with the ease of an ordinary step ladder, and requires no additional storage space. Bears the inspected ladder label of the Underwriters' Laboratories, Inc., and conforms to all details of A.S.A. and State Ladder Codes. Sizes: 3′ to 18′, height to platform. Equipped with "Gold Medal" Safety Spreader with each step truss-rodded and knee-braced.

PS CO. OFFERS A WIDE VARIETY of "Gold Medal" step, extension and single ladders for every purpose, with top quality in every price range.

SAFETY LADDERS

Made in 20″ and 30″ widths, from 1 to 5 steps without handrails (shown); 2 to 12 steps with handrails. Easy-to-roll, self-locking casters. Flared bottom design gives maximum stability. Steel angle reinforces all steps. Write for Bulletin SL-1.



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Scaffolds for High Jobs

Aids to Safe Construction and Maintenance

SCAFFOLDS used in industry range from light movable work platforms for maintenance and repair work to the sectional steel scaffolds used on large building projects.

Wood scaffolding, erected on the job by contractors, is not included in this article. Construction details will be found in NSC's *Accident Prevention Manual for Industrial Operations* and in construction manuals.

Types of scaffolds. Three principal classifications of metal scaffolds are:

1. *Built-up scaffolds*, as the name implies, are built up from the ground or floor as the work progresses. They can be made up from sectional frames or from tubes and couplers.
2. *Hanging scaffolds.* This type comprises two classifications: heavy-duty suspended equipment and light-duty swinging scaffolds.
3. *Rolling scaffolds.* Easily movable units can be made up by fitting casters to either of the two types of built-up scaffolding, or to special aluminum components.

Telescoping platforms permit safe access to fixtures mounted at various heights.

Tube and coupler scaffolds are used on large jobs where work is carried on at great heights. Scaffolds maybe purchased or rented. When rented, erection and dismantling by experienced crews are included in the contract.

Steel scaffolds, except for wood planks, are noncombustible. They offer less resistance to wind than all-wood scaffolds. Interchangeable parts make the scaffolding adaptable to a variety of jobs and facilitate erection and dismantling.

Rolling scaffolds. In addition to those assembled from sectional steel scaffolding or tube-and-coupler components and fitted with casters, there are three other types:

1. Sectional ladder scaffolds of steel or aluminum.
2. Sectional aluminum scaffolds with interior or exterior stairway.
3. Scaffolds made of folding one-piece sections.

Sectional rolling scaffolds should not be erected higher than permitted by governing codes, which usually require that the shortest base dimension be one-fourth of the platform height. Base dimensions can be increased by outriggers.

These workstands provide more space than a platform ladder, permit more than one man to work, and provide more space for tools.

Workstands of the wheelbarrow type can be moved easily by one man.

Telescoping portable towers are used for some maintenance work.

Caster locks should be provided on movable equipment to prevent movement while in use.

Swinging scaffolds are light-duty equipment primarily for men and hand tools. They are used for painting, tuck-pointing, glazing, and other operations where scaffold height is adjusted frequently as work progresses.

A swinging scaffold should be hung securely from eaves, cornices, or other reliable support, with strong hooks. Anchorage should be inspected before hooks are placed.

Rolling scaffolds of many types and sizes facilitate interior maintenance work. (Patent Scaffolding Co.)

Ropes should be of best grade manila, not less than ¾ in., on at least 6-in. blocks.

Steel cable should be not less than 5/16 in. Steel cable is wound on a drum, not pulled by hand.

Safety belts attached to life lines extending from the roof to the ground should be worn by workers on swinging scaffolds. The safety belt rope should be tied to the life line with a triple sliding hitch.

Suspended scaffolds (heavy duty) are supported by outrigger I-beams attached to the frame of the building. They are recommended for use on buildings more than 5 stories high which have a frame to provide the overhead support. The scaffold is raised and lowered by steel cable operated by a winch.

Shackles or beam clamps holding cables should be securely fastened to outriggers with a stop bolt in the outer end of each outrigger. Cables should be securely fastened to outriggers and to the putlogs which carry the platform, or to the hoisting machines.

Ladder-jack scaffolds are used chiefly by painters and electricians. They should not be used more than 22 ft. above ground or floor or on extension ladders. An unsupported span should not be more than 10

—*To page 40*

FOR SAFETY'S SAKE

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INDUSTRIAL VACUUM CLEANERS FOR WET AND DRY PICKUP

Cleans floors, walls, ceilings, machinery, oil sumps, water, metal chips, etc. Over thirty models to choose from. Every size from 6 to 55 gallons with ¾ to 7 h. p. motors. Inside or outside type filter bags. Dozens of attachments for use with 1½", 2" or 3" hose. Illustrated unit (model 655) designed for use on any standard 55 gallon drum. Excellent for furnace cleaning.

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Twelve models from 12 to 24 inch size—designed for maintaining factory or office floors. Every practical operating and safety feature — momentary contact safety switch, fully adjustable handle, non-marking bumpers, 3 conductor cord plus Hild heavy duty motor and silent gear unit for years of dependable operation. Available with shower-feed tank and brush.

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ft. Only one person should be allowed to work on this type.

Railings and toeboards. Most codes require railings on scaffolds more than 12 ft. high, but railings are desirable on lower scaffolds. A top rail should be 36-42 in. above the floor with an intermediate rail halfway between the top rail and the walkway surface.

Toeboards are needed to prevent tools or materials from falling.

Overhead protection, consisting of planking heavy enough to stop any falling object, should be provided for scaffolds when men are working overhead. This protection should be not more than 9 ft. above the working platform.

Sidewalk bridges. Where construction or repair work is carried on over sidewalks, protection for pedestrian traffic is needed. Sidewalk bridges of adequate strength are provided by companies furnishing sectional steel scaffolding.

Portable Ladders

—*From page 36*

Stabilizers. When a ladder is used on an uneven surface, hydraulic stabilizers attached to the feet keep a ladder firm and steady. These can be attached to any straight or extension ladder.

Maintenance

Inspection. Look for: loose rungs or steps; screws, bolts, and other metal parts broken or missing; cracked or broken uprights, braces, steps or rungs; slivers; worn or damaged shoes.

Defective ladders should be marked and taken out of service until defects have been corrected. If beyond repair, they should be destroyed promptly.

Records of the condition of each ladder should be kept.

Storage. Ladders should not be stored where they will be exposed to weather, nor near radiators, stoves, or steam pipes.

Protective coatings. Two coats of linseed oil, spar varnish or a clear wood preservative will increase resistance to weathering without adding noticeably to the weight.

Painting is permitted by the ASA Code, if ladders are inspected before painting by experienced inspectors acting for the purchaser and ladders are not for resale. This practice, however, is condemned by many users and is forbidden in some states.

Wood preservatives, which consist of toxic chemicals in non-aqueous solution, prolong the life of wood exposed to weather or in contact with the ground. They offer special protection at the joints or rung holes and tenons.

Preservatives of the NSP type (non-swelling, paintable) do not interfere with subsequent painting and varnishing. * * *

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MIS-GUIDED MISSILES

with MOTT
Hammer-Knife Mowers!

Here is the safest . . . the most versatile mower available today! The free-swinging blades of the patented MOTT Hammer-Knife mower fold back upon contact with obstructions . . . return to cutting position when clear . . . thus eliminating the danger of flying sticks, stones and other debris. Nothing—not even the clippings, are thrown from the mower.

The best of both rotary and reel are combined to provide an even cut regardless of roughness of terrain or condition of the grass . . . even when wet! The cutting action of the knives cut and re-cut the clippings into a fine mulch and deposit them evenly behind the mower.

Smooth even lawns . . . or tall man-sized weeds—ALL are cut and shredded in just one pass! AND there are 32 models to choose from—18" to 19 ft. gangs. Leaf mulching attachments for all mowers. Ideal for industrial tracts, estates, parks and schools.

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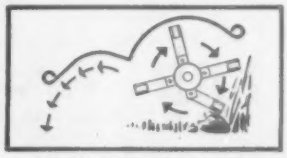

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HI-VIZ Safety Kit S-20: one 16 oz. spray-can each of white primer, HI-VIZ Color and UVITRON Protective Sealer plus quarter pints each of the 8 HI-VIZ colors in Alkyd Enamel and two quarter pints each of white primer and UVITRON® Protective Sealer.

Order your easy-to-use, inexpensive trial kit of HI-VIZ Fluorescent Industrial Safety Paint today! These are the government tested, high visibility colors you see and remember on safety-marked civilian and military aircraft . . . glowing safety colors that demand immediate attention from dawn to dusk outdoors and under all in-plant lighting systems . . . wherever better visibility can reduce accident occurrence. Write today for free fluorescent demonstrator "Color Card", where-to-use booklet, detailed 12-pg. HI-VIZ Idea Brochure illustrated in fluorescent color and application data.

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Sanitation Maintenance

—*From page 28*

Smoking areas are now provided in most plants where smoking on the job is not permitted. Receptacles which will not slip and spill their contents should be provided for cigaret butts and ashes.

Cleaning Supplies

Improvements in mechanical cleaning equipment have been matched by the development of more efficient cleaning materials.

Disinfectants and deodorants are useful, particularly for washrooms and garbage cans. They are not substitutes for detergents.

Odors may indicate unsanitary conditions. However, chronic odors, as from urinals, indicate either bad fixtures, or failure to clean by removing scale and decomposing organic matter. Improved cleaning techniques can almost always eliminate the seeming need for deodorants.

Much research has gone into cleaning techniques. Manufacturers can furnish helpful data on maintenance methods.

Detergents. Water actually does the cleaning but usually it needs the aid of a detergent—soap, an alkaline cleaner, or a synthetic cleaning compound. Soap is a detergent, but not all detergents are soaps.

There are three types of dirt: Water-soluble matter, oils and greases, and inert solids.

A cleaner removes dirt by dissolving, emulsifying, or suspending it.

Soap is one of the oldest cleaners and a most useful one. It has one serious defect—the formation of curds in hard water. As soaps leave a film, careful rinsing is necessary, particularly in those compounds which do not include adequate sequestering or chelating agents.

Synthetic detergents are derived from sources other than fats and oils. Petroleum and coal tar derivatives and the by-products of some industries provide the raw materials. These cleaners can be used with hard water.

Alkalis such as washing soda, soluble silicates, and various phosphates form the third class of cleaning materials. Compounds of these are marketed under a variety of trade names. They are useful where sudsy cleaners are not desirable, but dilution strengths must be closely controlled to avoid damage to surfaces. They do not form a slippery film on floors.

Hand protection. Since many cleaning materials are too powerful for safe use on the skin, rubber or plastic gloves are often needed.

JANITORS' AIDS

Vacuum cleaner—Heavy-duty with attachments.
Floor machine—Size, type, and attachments for the job.
Brooms, brushes, mops, buckets.
Cheesecloth.
Rubber or plastic gloves.
Bowl and urinal swabs.
Detergents—Soap or synthetic.
Disinfectants and deodorants.
Resilient floor coating.

Put Color to Work

—*From page 29*

companies have introduced minor variations from the ASA code, particularly where specific problems have been created by special products.

Red is for identification of fire-protection apparatus, and for walls or supports on which extinguishers are mounted; flammable liquid containers (except shipping containers) on which the name of the contents should be stenciled; lights at barricades and danger signs; emergency stops on machines such as rubber mills, wire blocks and flat work ironers, and emergency stop buttons for electrical switches.

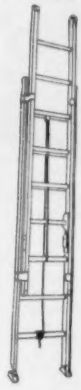
Yellow has high visibility, suitable for marking hazards that may result in slipping, falling, and bumping into objects. Stripes or checks of yellow and black may be used to attract special attention. Top and bottom treads of stairways, low beams and pipes, and crane hooks

FIBER GLASS

REINFORCED PLASTIC LADDERS

● STRONG ● LIGHT ● DURABLE ● NON-CONDUCTOR

Utilizing sandwich construction balsa core laminated with fiber glass reinforced plastic. Aluminum, plastic coated aluminum, or wood rungs are plastic welded to rails, resulting in tough yet smooth splinter-free finish resistant to chemicals, heat and water absorption. Yellow side rails for safety. Flat aluminum steps used in step ladder. Available in extension, single sectional and step ladders. Also Oak Rolling and special ladders for stores, warehouses, file rooms.



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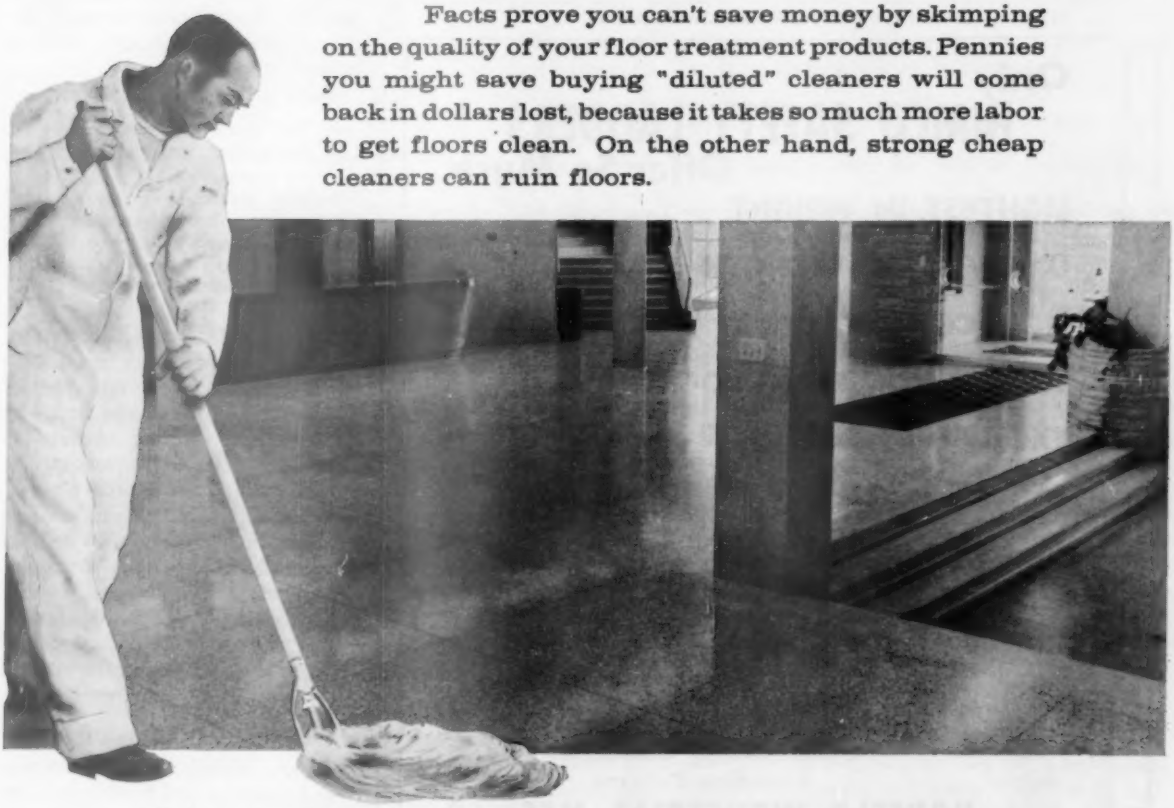
SUPER SHINE-ALL® cuts labor time; eliminates the whole step of rinsing in normal cleaning. Its extra cleaning quality neutralizes the toughest floor soil problems, without a trace of harm to finest flooring. UL listed for slip resistance.

Facts prove you can't save money by skimping on the quality of your floor treatment products. Pennies you might save buying "diluted" cleaners will come back in dollars lost, because it takes so much more labor to get floors clean. On the other hand, strong cheap cleaners can ruin floors.



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are places where yellow may be used.

Black and yellow stripes often are used on mobile equipment, such as tractors and industrial locomotives.

Green in combination with white, such as a green cross on a white background, designates location of first-aid and safety equipment. Location of stretchers, gas masks, and bulletin boards is identified by this color.

Black and white, in stripes or checks, are used for housekeeping and traffic markings.

Orange has high attention value. It is the basic color for marking dangerous parts of machines or energized equipment. It emphasizes such hazards when enclosure doors are open, or when gear, belt, or other guards around moving equipment are open or removed, exposing unguarded hazards.

Blue is for warnings, such as painted barriers or flags. These should be located conspicuously at the starting point or power source of machinery.

Purple is the official color for designating radiation hazards. Yellow should be used with purple for tags, labels, signs, and floor markers.

Identification of Piping

Five basic colors for identification of the contents of pipes are specified in ASA Code, *Scheme for Identification of Piping Systems, A13.1-1956.* Identification may be provided by stenciled legends, decalcomanias, self-adhesive tape, or painted stripes.

Basic identifying colors are:

F. Fire protection—red.
D. Dangerous materials — yellow or orange.
S. Safe materials—green or achromatic colors (white, black, gray, aluminum).
P. Protective materials — bright blue.

Color may be applied the entire length of the pipe or in bands 8-10 in. wide near valves and pumps, and at intervals along the line. The name of the specific material is stenciled in black conspicuously at valves, pumps, and similar places.

Color stripes painted at the edges of the color bands also may be used to identify the exact contents of lines, but this is less satisfactory than stenciled identifications. Labels which conform in color and size of letter to the code are on the market.

Industrial Finishes

Paints, enamels, and lacquers provide a practical and flexible medium for the application of color. Industrial finishes often are subject to severe exposures; many types of paint have been developed for special needs.

Floor coatings. Synthetic enamels and rubber base floor coatings give better service on concrete than ordinary floor enamels and are more resistant to moisture, acids, and alkalis.

Light-colored floors conserve light. They may be stippled with darker colors to avoid glaring contrasts.

Rust protection. Paints forming a tight bond on clean metal protect it

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Available in the following colors: Lt. Gray, Dk. Gray, Green, Yellow, Tile Red, Black and White. Write for color card, bulletin and name of nearest distributor.

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The one that absorbs the most . . .
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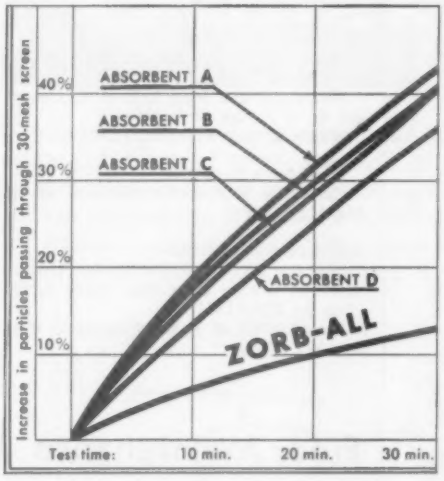
or one that makes your floors safe?



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The job of a floor absorbent is to correct a hazard . . . not compound it. This is where materials with spectacular speeds and high ratios of absorption frequently fall down.

They pick up liquids, and convert them into slippery muds.

They lose their hardness in use, and become ineffective.

Adding insult to injury, they cake under traffic and can be removed only by laborious scraping.

The explanation is quite simple. These highly absorptive materials are soft and fine in character . . . too soft and fine to provide safety.

Wyandotte ZORB-ALL® meets the true test of safety in a floor absorbent. IT WON'T BREAK DOWN!

ZORB-ALL is not the fastest floor absorbent on the market. It is the *safest* . . . and we intend to keep it that way.

It stands up best under severe punishment . . . assures non-skid stops when more absorptive materials fail . . . and remains effective nearly twice as long as such materials.

All of this has been proved time and again in laboratory tests, in skid tests with rolling equipment, and in actual use.

Reason: ZORB-ALL's rugged, angular particles have unequalled resistance to breakdown. Maximum skid resistance is one benefit. Ease of clean-up is another.

ZORB-ALL is completely safe, and low in cost. Use it wherever slipperiness endangers workers or vehicles. Get the facts from your Wyandotte representative or jobber. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California; and Atlanta, Georgia. Offices in principal cities.*

Wyandotte CHEMICALS
REG. U. S. PAT. OFF.

J. B. FORD DIVISION

against rust and corrosion. Where rust has started, ordinary paint is ineffective because corrosion continues under the paint film. Rust-sealing coatings, clear or pigmented, are often helpful.

For High Visibility

Where increased visibility is imimportant, particularly in dim light or at a distance, special types of paint, tape and plastics are finding increasing use for identification of equipment and warning signs.

Fluorescent pigments are incorporated into a wide variety of paints and plastics. They are used extensively in aviation for aircraft markings and airport ground and obstruction markings.

In industry these vivid colors are used for many purposes where higher visibility means increased safety, such as: lift trucks, low clearance warnings, barricades, pipe line identification, switch boxes, protective hats, fire protection equipment, exits, first aid stations, valves, etc.

Reflective coatings or buttons are effective for direction or warning signs where light from headlights, flashlights or other sources is available. They are frequently used in connection with fluorescent materials on warning signs.

Phosphorescent materials glow after exposure to light and remain luminous after the light is extinguished. They are observed best under total or near total darkness. The glow is of low intensity, suitable only for close viewing in darkness.

Solve your safety problems with this all-steel, portable, fully collapsible barricade!
GUARD-GATE
PATENTED
Available in 4 ft., 6 ft., 8 ft. models
Guard-Gate is a practical safety barricade that quickly extends to its full length, yet collapses to just inches for easy storage when not in use. It is delivered complete, ready to set up, with two red warning flags and mounting brackets for flashers or flares. (Flashers available as optional equipment). Glass-beaded reflectorization on traffic-yellow cross bars for maximum night time visibility. Individually packaged in fibre board box that serves as a carrying case or storage container for unit when not in use. Stands 30" high; appr. wt. 20 lbs. (less flashers). Write for information and name of nearest dealer.
WEST SIDE IRON WORKS, Inc.
Dept. MI
327 Front Avenue, N.W. • Grand Rapids 4, Michigan

References—Color

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Floor Maintenance

FLOORS of all types last longer, look better and are safer when properly cared for. A protective coating is desirable for most materials under most conditions.

Dusting of concrete can be checked by treating with a sealer. If color is desired, a penetrating dye or a floor enamel may be used.

Linoleum, asphalt tile, vinyl tile and rubber tile are resilient and decorative. Care consists of cleaning and protecting the surface with a suitable coating.

Hardwood flooring in its natural state dries out and cracks and splinters under traffic. Scrubbing raises the grain of the wood and excessive moisture causes it to swell and warp. Sealers produce a durable, penetrating finish.

Resilient floor coatings protect the surface and preserve appearance. They make regular cleaning

GO UP WITH CONFIDENCE ON

BALLYMORE

Safety-Step LADDERS

Now...Ballymore combines welded steel or aluminum safety treads with wide-base pyramid design to offer extra safety and stability. Ballymore ladders let you climb quickly . . . and with confidence—any required height up to 15 feet. Spring-mounted casters that retract when you step on the first step is another safety "plus." They let you roll the ladder easily, yet grip the floor surely to provide safety at all levels.
All welded, corrosion-resistant Ballymore Safety-Step Ladders are available in four types—with 47 models to choose from. Step up to a new standard of safety today.

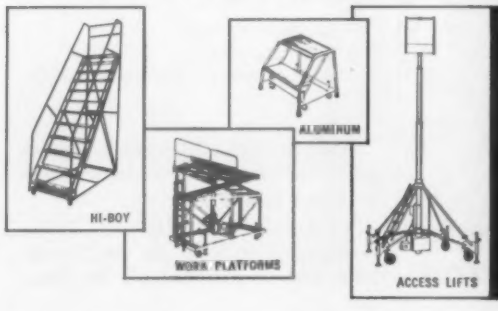
WITH HANDRAILS

WITHOUT HANDRAILS

CALL YOUR LOCAL DISTRIBUTOR TODAY

Ballymore SAFETY LADDERS

WRITE TODAY—Send for free illustrated catalog of complete line of Safety-Step Ladders for every requirement. Ballymore Company, West Chester 17, Pa.



BALLYMORE
EQUIPMENT FOR WORKING
Safely ABOVE FLOOR LEVEL

Proven Safety . . .
That's Why Leading Industries Select
Blue Ribbon LADDERS

APPROVED AND LABELED BY
Underwriters' Laboratories, Inc.

BLUE RIBBON LINE

For over 60 years plant maintenance men everywhere have selected Blue Ribbon ladders for all climbing needs. The reason . . . safety *plus* versatility. They know only finest materials are used . . . most exacting safety and quality specifications followed. They know Blue Ribbon ladders are built for long-time, safe service . . . exhaustive, independent tests prove it.

Learn how Blue Ribbon ladders can fill your needs . . .

Write Today For 24-Page
BLUE RIBBON LADDER MANUAL

GOSHEN MANUFACTURING CO., INC.
GOSHEN, INDIANA

Since 1891, Maker of America's Finest Ladders

easier by keeping dirt from being ground into the floor. Good coatings, properly applied, can provide a slip-resistant surface.

Water emulsion (self-polishing) coatings can be divided into two general groups—those with a high wax content and those with a high resin content. Other ingredients, such as colloidal silica, are sometimes added to increase the slip-resistant qualities of the treatment.

Water emulsion coatings can be used on all types of floors. Solvent type waxes which require buffing, cause deterioration of asphalt and rubber.

Floor cleaners. Strong alkalis and coarse abrasives are injurious to most types of flooring. Detergents that are both effective and mild will meet most floor maintenance needs.

Cleaners should not leave a slippery film. Soap is permissible for concrete, common brick, wood block and mastic. Marble and smooth tile require a detergent that leaves no slippery residue.

Standards. Floor coating and finishing materials are listed in three classes by Underwriters' Laboratories *Accident Equipment List:*

I. Floor Treatment Materials

1. Water-base materials
2. Fillers, sealers, varnishes and similar materials
3. Detergents
4. Abrasive-grit-bearing liquids
5. Waxes other than water-base
6. Sweeping compounds

Materials listed have been found to have slip-resistant characteristics of not less than 0.5, as determined by the UL static friction test. Materials are listed according to fire hazard in the *Gas and Oil Equipment List.*

II. Oil and Grease Absorbents

III. Walkway Construction Materials. Includes floor plates and stair treads made of:

1. Natural stone
2. Composition
3. Abrasive-grit-surfaced materials

Maintenance methods. Maintenance of hard and resilient floors is of two types:

1. *Routine care* (usually daily) is designed to keep up the cleanliness and appearance of the floor.

It may consist of dry or semi-dry methods, such as sweeping, dust mopping, buffing or damp mopping.

2. *Periodic maintenance* removes by scrubbing the more stubborn soils that have survived routine methods. With resilient floors it may include removal of worn and discolored finishes in preparation for a new coating.

Oil Absorbents

Most of the oil and grease absorbents now used in industry are of the all-purpose type effective for absorption of water, paint, ink, food wastes, chemicals and other liquids as well as oil and grease.

Absorbents are used in machine shops, factories, oil refineries, chemical plants, railroad shops, aircraft hangars, bus and truck terminals, garages and filling stations, institutional kitchens, food processing plants, boiler rooms and many other locations.

For winter use on ice and snow they provide increased safety underfoot and better traction for vehicular traffic.

Absorbents may be spread over the floor by shovel, broadcast by hand, sprinkled from an open-top container, or spread by a garden fertilizer spreader.

Commercial absorbents have a

A layer of oil absorbent around the base of a machine makes it easy to remove splashes of oil and other liquids. The floor is protected and slipping hazards avoided. (Wyandotte Chemical Co.)

ACCIDENT

isn't a nice word nor a pleasant subject to think about. But it's an unusual plant manager indeed who does not spend time and thought reviewing accidents . . . their causes and prevention, so that he can equip men and machines for maximum safety.

But how about the floors? Water, grease or oil, wood or metal shavings can cause a slipping hazard to make floors a danger area in your plant.

With Sure-Foot Non-Slip Abrasive Paint, you can *paint on* protection to prevent costly accidents for less than 10¢ a square foot—including installation!

Sure-Foot is easy to apply by brush, roller or squeegee. It covers any surface—wood, concrete or metal. Dries quickly to a tough, abrasive, non-skid surface that lasts for years. Wherever there's a slipping hazard on plant premises, equipment or manufactured products, Sure-Foot provides dependable protection . . . economically.

Available in eye-easing gray, red, black and green as well as traffic yellow for plant zoning. Ask your distributor for Sure-Foot.

←Paint it on...Inside or out!—

Sure-Foot
NON-SLIP ABRASIVE PAINT

SURE-FOOT DISTRIBUTORS

Central Chemical Co.
Dallas 1, Texas
Continental Safety Equipment Co.
St. Paul 4, Minnesota
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Dayton 2, Ohio
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Green Bay, Wisconsin
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Philadelphia 4, Pennsylvania
Guardian Safety Equipment Co.
Tulsa 4, Oklahoma
(Branch, Dallas, Texas)
Guardian Safety Equipment Co.
Orange, New Jersey
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Houston 19, Texas
Guardian Safety Equipment Co.
Los Angeles 3, California
Guardian Safety Equipment Co.
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Safety Equipment Distributing Co.
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Safety Equipment & Supply Co.
Fort Wayne 7, Indiana
Safety, Incorporated
St. Louis 3, Missouri
(Branch, Kansas City, Mo.)
Safety Supply Company
Toronto 1, Ont., Canada
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Pittsburgh 30, Pa.
Standard Industrial Products Co.
Peoria 5, Illinois
Universal Safety &
Fire Equip. Co.
Salt Lake City 11, Utah
Universal Safety Equipment Co.
Chicago 39, Ill.
Zink Safety Equipment Co.
Kansas City, Missouri

FROST PAINT & OIL CORPORATION
1209 N.E. TYLER
MINNEAPOLIS 13, MINN.

much greater absorbing capacity than sawdust, waste or rags. They are non-combustible and less bulky.

Sweeping compounds keep down dust from dry sweeping. These are listed by Underwriters' Laboratories in two groups: Class I, non-combustible; Class II, slow burning. Tests include combustibility, behavior on heating and spontaneous heating characteristics of these compounds. * * *

Rodent and Insect Control

RATS, MICE, AND INSECTS eat, destroy, and contaminate millions of dollars worth of food and other materials every year. These pests are also carriers of many diseases.

An effective program of rodent control has three parts:

1. *Sanitation*—taking away food and shelter.
2. *Ratproofing*—building him out of places where he can get food and cover.
3. *Reduction*—by various methods of killing. Without the other two methods, reduction can be only temporary.

Rodents cannot survive without food, water, and shelter. This makes good housekeeping vital for factory, home, and farm—indoors and out.

Scraps from the kitchen and from employees' lunches should be placed in covered metal containers. Spilled grain or other edible materials should be swept up daily.

Ratproof construction helps to keep them out of a building. Concrete, bricks, and metals of 24-gauge or heavier are effective. Hardware cloth screens should have not more than ½-in. openings—for mice ¼ in.

Material stored on the ground provides shelter. Rodents will have difficulty getting established if material is stored on racks 18 in. above ground.

Extermination. Traps, gases, and poisons are useful methods of keeping down the rodent population in conjunction with other sanitary control measures. Natural enemies, such as dogs, cats, ferrets, snakes and hawks, are not dependable and some of them, obviously, are not desirable pets.

Many types of traps have been devised but the baited wooden snap-trap is still widely used.

Poisons. Red squill has long been a popular and effective rat killer. It acts as an emetic on other animals but rats and mice cannot vomit and death results.

Warfarin is also relatively harmless to most other animals and to human beings. It is used in establishments handling food products where more toxic substances could not be used safely.

More powerful poisons, such as thallium sulfate and sodium fluoroacetate (1080) are not for amateur use.

Many other rodent killers introduced in recent years have been discarded because they had too many disadvantages.

Fumigation. Fumigant gases should not be used indoors by non-professionals. Carbon monoxide

Circle Item No. 26—Reader Service Card

Take the hazard out of Floor Maintenance

WITH HOLT EXPLOSION PROOF COMMANDER

Model EPC16D, showing handle in space-saving stowaway position.

Holt Commander is designed expressly for safe maintenance of floors in oil refineries, atomic research plants, powder factories, and other hazardous industries. There's no outside wiring, Entire unit, from brush to handgrip, is constructed, sealed and safety-tested to prevent sparks and static that might ignite gas, dust, fumes or vapors. Static eliminator wire in brush, a Holt exclusive, even prevents shocks to operator.

With this one machine and Holt Quick-Change Attachments you do a complete floor maintenance job — polish, wax, buff, scrub, etc. Dual handles give operator better control; reduce fatigue. Made in 16 and 20" sizes. For full story write now to Dept. W-3.

32

Sales and Service Centers in Major Cities

HOLT MANUFACTURING CO.
BETTER FLOOR MACHINES FOR MORE THAN 30 YEARS

669 - 20th St., Oakland 12, Calif., or 272 Badger Ave., Newark 8, N. J.

BABCOCK Industrial
***Safety Engineered* LADDERS**

FIRST Choice of Industrials and Contractors. The Mechanics' Step (right) is only one of Babcock's complete line of Industry-tested ladders. Built for a long life of service—BABCOCK quality in every inch.

Write for the Babcock Industrial Ladder Folder, describing other Extension Ladders, Single Ladders and Step Ladders.

BE SURE • BE SAFE • BUY BABCOCK

the W. W. BABCOCK CO., INC.
BATH, NEW YORK

Circle Item No. 27—Reader Service Card

can be used in outdoor places. A hose attached to an automobile exhaust is put down the burrow.

Chloropicrin has the advantage of being repellent. A heavy application is said to make a burrow uninhabitable for several months.

Calcium cyanide can be applied to burrows with a foot pump. It should not be used indoors where there may not be enough moisture to liberate cyanide, thus creating a delayed hazard. The gas is lighter than air and outdoors it dissipates rapidly. It has a strong warning odor.

Methyl bromide, an effective gas, should be used only by professional exterminators.

Insecticides. Wherever food is grown or processed, a constant fight must be waged against insects. For farm and garden the traditional poisons such as lead arsenate, Paris green and nicotine sulphate have been supplemented by much safer products, such as rotenone, pyrethrum, and DDT.

No insecticide, however, should be considered harmless. The user should avoid inhaling dust or spray of any kind and allowing any of it to remain on the skin. For extensive use, protective clothing and gloves and a respirator may be desirable.

Lethal fumigant gases are used for exterminating weevils, moths, beetles, and other insects. Carbon disulfide is effective for controlling weevils in grain but it is highly toxic and highly flammable.

Fumigation should be done only by licensed fumigators.

Storage of Pesticides. One person should be assigned responsibility for handling and storage. Containers and sprayers should be painted a distinctive color, with contents, uses, and hazards plainly marked. These materials should be kept under lock and key and used only by trained and supervised employees. * * *

Industrial Wipers

Removing oil and grease from machine tools and dies and other wiping jobs may be done by paper wipers, industrial wiping towels and waste or salvaged rags.

The first two methods are more likely to promote good housekeeping. Paper wipers are collected and burned at the end of the day, reducing the fire hazard. Convenient receptacles are needed. The paper is highly absorbent and has enough wet strength for use with solvents.

Wiping towels of sturdy cotton cloth are absorbent and offer some protection to the hands where work is done around metal chips and turnings or on rough surfaces. Cloth towels are furnished by industrial laundries.

With salvaged rags and waste, men sometimes keep partly used rags behind benches, in corners and under machines, creating a housekeeping problem and a fire hazard. Safe metal containers should be provided for used wipers and their use required. Regular collection and inspection are needed.

Cleanliness around steam pipes is particularly important. Accumulations of dust, lint, and other finely divided material that might ignite should be prevented.

Circle Item No. 28—Reader Service Card

WALL ASH TRAYS
BUTT SNUFFERS
PREVENT FIRES

New all-steel ash tray fastens to walls, posts, machines, columns, work benches. Keep plant floors clean and reduce fire hazards resulting from carelessly tossed cigarette butts. Encourage better rest room sanitation by installing over urinals and other plumbing fixtures.

Tray may be filled either with white silica sand or commercial oil absorbents. Butts can be sifted out with a cleaning screen stored in a clip underneath the tray. Tray need not be removed from the wall for emptying cigarette butts. BUTT-SNUFFERS are fire engine red, baked on enamel finish. Come in two sizes: Model #5—8" long, 5¼" wide, 6¾" high. Model #7—14" long, 7" wide, 8" high.

SAVE EXPENSIVE PLUMBING BILLS
NEW! MODEL # 4 PARK OR PUTOUT
with safety cigarette holder. For use over urinals and lavatories, to enable smoker to park that newly lighted cigarette, or put out that ready to discard butt. Keeps cigarettes from being tossed into plumbing fixtures. White baked on enamel finish. 8" long, 6 ¾" high, 5 ¼" wide.

Model	Each	Six	Dozen
#5	$2.95	$2.80 ea.	$2.65 ea.
#7	3.95	3.80 ea.	3.65 ea.
#4 Park or Put Out	3.25	3.05 ea.	2.95 ea.

SEND TRIAL ORDER F.O.B Shipping Point
Write for literature and discounts on larger quantities. Dept. N3

Safety Floor Products
3038 West 84th Place, Chicago 52, Ill.

"PROTECT YOUR CLIMBERS"
With Johnson All Rubber Ankle Action Dielectric Ladder Shoes. The Choice of Ladder Climbers in all parts of the world.

WORK SAFELY ALL-WAYS

FOR EXTENSION LADDERS

Our Step Ladder Shoes are popular with maintenance men in homes, office buildings, schools, hospitals and etc. Dealers in all principal cities. Ask your Safety Supply Dealer or send direct. Your order will be shipped promptly.

FOR STEP LADDERS

Johnson Ladder Shoe Inc. Eau Claire, Wisconsin

Circle Item No. 29—Reader Service Card

Circle Item No. 30—Reader Service Card

(FAST) (SAFE) VERSATILE

PRO-MO-LITE

Great... even with hardest water

Pro-Mo-Lite general-purpose liquid detergent saves you labor and money on a full range of floor cleaning jobs. Excellent for resilient and sealed wood floors . . forms no soap scum on contact with free lime in old cement or terrazzo surfaces . . . for complete stripping or simple daily maintenance . . . leaves no slippery film use with muriatic acid to clean and neutralize concrete floors in just ONE operation!

Write for information

MYCO

MASURY-YOUNG CO.
76 Roland Street Boston 29, Massachusetts
OFFICES IN PRINCIPAL CITIES

Planning the Plant

—From page 19

Winds of high velocity are most common in warmer climates, but no area can be considered immune. Where hurricanes or tornadoes are frequent, roof anchorage is important. Data regarding windstorms and lightning are available from insurance companies.

Waste disposal. Removal of solid and liquid wastes and prevention of air contamination are problems for many industries, often complicated by the expansion of centers of population. Some waste materials must be treated before they are discharged into streams or otherwise disposed of.

Sewers should not be located where leakage might contaminate water sources. Sewerage systems should have enough manholes or other openings for maintenance.

Radioactive wastes bring special problems. Procedures for their disposal have been established by the Atomic Energy Commission.

Employee transportation. Mass transportation systems are not always convenient for outlying plants, and a large proportion of employees use private automobiles. As a result, many parking lots are no longer adequate. Car pools have been encouraged by many companies to conserve parking space and reduce traffic congestion.

For buses, loading and unloading facilities should be arranged to avoid traffic hazards and reduce time required to reach the plant. A plant on a main highway should provide space off the road for loading and unloading. Shelters for employees using public transportation should be considered.

Bus stations within the plant have been established by some companies. Buses may go down a ramp to a central location, and employees reach work areas through passages below the main production floor.

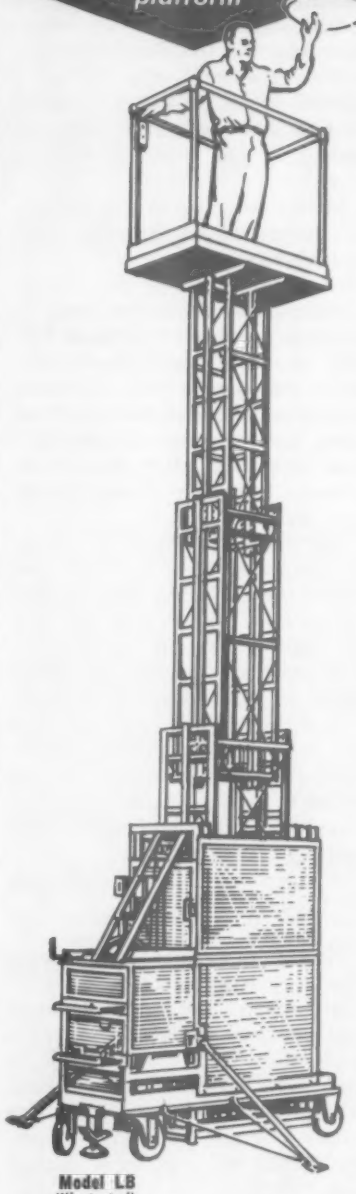
Entrances and exits. Mass production requires quick and safe movement of materials and personnel in and out of the plant.

Where volume of traffic is heavy, receiving and shipping departments should have depressed docks or

Circle Item No. 31—Reader Service Card

Complete Safety with a HI-REACH TELESCOPER

Fast work with all tools and materials on the platform



Model LB (illustrated)
Hi-Reach Telescoper
Lifts 20 ft. to 40 ft.
$1510.00 up

Model PUL
Lift 10'9"—$370.00
Lift 15'0"—$400.00

Custom built Hi-Reach Telescopers up to 100 ft.
Write for complete catalogue

Headquarters for standard and special built overhead servicing lifters and material handling equipment since 1901.

ECONOMY ENGINEERING
4518 West Lake Street, Chicago 24, Illinois

elevating platforms to permit loading and unloading by mechanical means at floor level.

Rail, highway truck, industrial truck and pedestrian traffic should be separated, where possible. If impossible, added precautions are needed.

Sharp turns, grades, blind spots, intersections, crossovers and points of congestion can often be avoided by advance planning.

Entrance and exit gates should be at least 35 ft. from property-line structures that might obstruct vision. Gates for vehicular traffic should permit outgoing drivers to have a clear view of cross traffic.

Industrial Buildings

Movement of industry to outlying areas, where land values are lower, has encouraged construction of one-story plants. In addition to somewhat lower costs, advantages of single-story construction include:

1. Concentration of operations under one roof.
2. No stairs or elevators.
3. Ease in routing and handling heavy and bulky equipment.
4. Better lighting and ventilation.
5. Easier isolation of hazardous operations.
6. Efficient handling of material in process.
7. Ease of supervision.
8. Lower operating and maintenance costs.
9. Possibilities of pleasing architecture and landscaping.

Multi-story construction is favored, where flow of materials in process is aided by gravity. In regions where floods may occur, it permits removal of valuable equipment to upper floors.

Light and air. Modern lighting and air conditioning make man independent of nature for light and climate. Controlled conditions may be obtained in a windowless factory or in one of conventional design. Windowless buildings, however, may complicate fire protection problems.

Roofs. Flat roofs or those with few projections are comparatively low in cost. Monitor and sawtooth

THE POSITIVE
LADDER SAFETY DEVICE
LOCKS-IN-A-NOTCH

Prevents death and injuries from falling.

If climber starts to fall, device locks in a deep notch on carrier rail and limits fall to approximately 6 inches — distance between notches.

LOCKS AUTOMATICALLY and INSTANTLY—HOLDS SECURELY

Will catch and hold workman if he starts to fall, even if unconscious. Cannot slip on down ladder. Requires no attention from climber; he climbs in normal manner. Inexpensive. Easy to install; 3 men can clamp it to ordinary ladder in few hours. Clamps to any rung ladder, peg ladder, pole or framework. No welding or cutting. Notched rail hot-dipped galvanized. Entire equipment rust and corrosion proof. Can be kept free of ice by applying heat inside the carrier rail. In use approx. 11 years. Approved by Safety Engineers and Govt. Agencies throughout country. Patented. Manufactured only by

SAFETY TOWER LADDER CO.
1024 Burbank Blvd., P.O. Box 1057
BURBANK, CALIFORNIA

DRI-RITE WATER, OIL AND GREASE ABSORBENTS

Dries and cleans floors—Absorbs water, oil and grease—Eliminates scrubbing. Prevents slipping accidents.

Dri-Rite quality absorbents have been proven in use by large and small industrial plants for many years.

Exclusive Territorial Distributorships Available

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100 W. Chicago Ave., Chicago 10, Ill.

SEE a demonstration by a specialist

REMOVING SLIPPERINESS FROM FLOORS

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WEST

COTTERMAN
WELDED STEEL SAFETY LADDERS
For Filing Rooms — Stock Rooms — Vaults

SAFE
●
STRONG
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EASY TO MOVE
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EASY TO CLIMB
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NON-SKID STEPS

Frame work made from heavy gauge 1" diameter round steel furniture tubing, with all joints electrically welded. Mounted on Swivel Brake Casters which allow the ladder to be rolled freely when no one is on it. When you step on the ladder the rubber cushioned legs rest on the floor and prevent rolling.

Made in 13 heights—from 12" 1 Step to 117" 13 Step, and in 4 widths—18", 20", 26" and 32", with and without hand and platform rails.

We also manufacture the
COTTERMAN TRUCK - N - LADDER
A Truck and Ladder combined in a single unit.

Write for Folder No. 58-N for complete information and prices on both these items.

Manufactured by
I. D. COTTERMAN
123 W. Spring Ave. Naperville, Ill.

TULITO
SAFETY CLAMP
(Patented. Other Patents Pending)

LOCKS INSTANTLY!
Absolute Safety Assured

Forget the dangers of high climbing ...use TULITO SAFETY CLAMPS. Thousands are now in use on every type of structure.

FULLY APPROVED BY INDUSTRIAL COMMISSIONERS AND SAFETY ENGINEERS.

MEYER MACHINE, INC.
137 Bluff Street Red Wing, Minnesota

roofs admit light and air to the center of buildings but add to construction and maintenance costs. Artificial light sources which rival natural light make daylight less important.

Material handling. Studies of the flow of materials through a plant —from their receipt, through processing and shipment as finished products—often reveal ways to reduce handling operations and hazards.

Loading docks should be planned for traffic outside and within the plant.

Adequate clearances between vehicles and fixed structures must be provided. This is particularly important with plant railways and driveways.

Waste material must be removed constantly. Scrap and junk accumulate, when efficient removal facilities are not provided.

Machine Layout

The work station. Each operator should be able to sit or stand at and move safely about his machine, bench, desk or other equipment.

He must be able to get into that space without slipping, bumping objects or coming into contact with live electrical parts or moving machinery.

He must have room to move material being processed. There must also be space for hoists, lifts or trucks, when needed.

Insufficient headroom is a hazard, often resulting from pipelines, equipment supports, overhead conveyors and other installations, permanent or temporary. Elevation drawings should be studied to determine the location of potentially troublesome equipment.

Vertical clearance of at least 7 ft. should be provided, especially over aisles, passageways and stairways. Where this is not practicable, overhead obstructions should be padded or marked with contrasting paint.

Storage space for raw and finished materials must be adequate to avoid bad housekeeping, fire hazards, overloaded floors, damaged stock and waste motion.

Maintenance is facilitated, when such items as personal protective equipment, ladders and hoisting equipment are readily available.

Safe access to all parts of the plant should be provided by:

Stairways where conditions permit.

Fixed ladders where space is limited.

Portable ladders where need for access is relatively infrequent.

Stairs for general use should be convenient to areas served, have standard handrails, and be free from obstructions at top and bottom.

In-plant Traffic

Free movement of power trucks, hand trucks and tractors in and about buildings requires adequate clearance in aisles and other passageways and at corners and curves.

Aisles, particularly main traffic aisles, must be as straight as possible, free from obstructions and wide enough to permit trucks to pass. Aisles for two-way traffic should be not less than 3 ft. wider than twice the width of the widest vehicle. For one-way traffic, aisles should be at least 3 ft. wider than the widest vehicle. These minimum widths are exceeded in many of the newer buildings.

Aisles should be clearly marked with white or black-and-white paint. Permanent markers, such as metal or plastic disks, are also used for this purpose.

Aisles should be well lighted. If not lighted at night by general lighting, night lights should be provided for service employees or off-shift workers. Emergency passageways should be marked by standard exit signs.

Cross aisles should be avoided at tops and bottoms of ramps. Sharp turns at the ends of ramps are hazardous.

Pedestrian traffic. Aisles should be wide enough to accommodate rush traffic to time clocks, lunchrooms and exit gates. Where foot traffic parallels vehicular traffic, the aisle edge should be marked by a conspicuous white line on the floor.

Protective lighting aids prevention of accidents, thefts and vandalism. In many instances it may reduce fire risks and provide useful light for outdoor night work.

Fences high and strong enough to deter trespassers are valuable in plant protection.

SECTION 3

INDUSTRIAL HEALTH ENGINEERING

IN SECTION 3:

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HEALTH HAZARDS have existed in many occupations from the earliest times. Early medical literature contains many references to occupational diseases which were generally accepted as part of the job.

But as industry grew and the number of harmful exposures increased, simple environmental cleanliness proved to be an inadequate defense. Extension of compensation laws to include an increasing number of occupational diseases stimulated research in hygiene of the workplace.

Exposures to be controlled include dusts, gases, vapors, and other air contaminants, extremes of temperature, radiant energy, and noise.

The industrial hygienist, the physician, and the safety engineer have a common interest in personal services, such as sanitary facilities, food service, and drinking water, which have an important bearing on employee welfare.

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Circular wash fountains with dispensers for hand cleanser, ventilated lockers with sloping tops on cove bases are features of this washroom. (Diamond Alkali Co.)

Washrooms and Lockers

Essentials for good working conditions

CLEAN, well-equipped washrooms and lockers are conspicuous features of the up-to-date plant. Such facilities attract desirable workers and keep them healthy and contented on the job.

Three points should be kept in mind when planning new washrooms, modernizing old ones, or adding to existing facilities:

1. Convenience of users.
2. Ease of maintenance.
3. Ratio of fixtures to employees.

Attention to these requirements when a building is planned will insure sufficient space and convenient locations, both for users and for plumbing locations. Later it may be necessary to fit facilities into less satisfactory space and at higher cost.

Installations which were originally adequate may not be satisfactory a few years later. Plant growth, and deterioration or obsolescence of equipment may change the picture. A survey will show the changes necessary to bring facilities up to current standards.

There comes a time when the shortcomings of an old washroom can't be hidden by a coat of fresh paint. Appearance may be improved temporarily but old fixtures, poor lighting, and other defects will remain. Twenty years is regarded as the maximum useful life of fixtures in industrial and public buildings.

Location. Planning can minimize travel time between job and washroom.

Lockers, toilets and lavatories may be in one central location or scattered through the plant, depending on its size, layout and type of operations.

In smaller plants, washrooms and lockers are usually near the entrance.

Toilets and lavatories should be not more than 200 ft. away from any work place. In multi-story buildings, one on each floor is desirable. If that is not practicable, they should not be more than one floor above or below the work place. A single washroom and locker room may be sufficient for a compact plant employing fewer than 500 persons.

Washrooms in large one-story buildings usually are scattered throughout the building. Where there are many small isolated buildings, as in chemical plants and railroad yards, or where much of the activity is outdoors, a centralized building may house all these facilities.

Accommodations should be located so that employees will not have to cross highways or railroad tracks to reach them.

When lockers and washrooms of a large plant are near the main entrance, lavatories and toilets are often scattered through the plant. This saves workers' time and makes it possible to close the main room during working hours, lessening danger of theft and need for close supervision.

Separate washrooms and lockers are desirable for departments with exposure to excessive dust, dirt, heat, vapors, or moisture. These need additional lavatories or shower baths.

Offsetting the advantages of scattered facilities is the higher cost of installation and maintenance. Central toilet and washing facilities are often preferred where women are employed. In some plants a full-time attendant may be needed.

Large plants with underground passageways connecting buildings and departments often locate personal service facilities along these corridors, conserving space for manufacturing operations. Another space-saving method is to locate facilities on balconies.

Light. Fixtures should provide sufficient light in all parts of the room. Walls, ceilings, and partitions in white or light colors conserve light and encourage cleanliness.

Ventilation. Unless the washroom has sufficient outside windows for natural ventilation, forced ventilation will be needed.

Floors, and walls to a height of at least 6 in., should be of impervious material, such as glazed tile or concrete with good friction characteristics.

Walls should form a tight joint at the floor level, or there should be a cove base at least 6 in. high. Walls should be impervious to water to a height of at least 5 ft. Wall and ceiling surfaces should be washable.

Wash Fixtures

Group washing equipment. In industrial plants, institutions, schools,

and other establishments where facilities must be provided for large groups, circular wash fountains are the most frequent choice.

Eight to 10 users can be accommodated at a 54-in. circular fountain and 5 to 6 at a 36-in. unit. Fewer valves and plumbing connections cut installation and maintenance costs.

Economy of water is another advantage. Several persons at a circular fountain use little more water than one at an individual basin. Each user washes in clean running water of regulated temperature. A foot or hand-controlled mechanism regulates the flow.

Semi-circular units 36 or 54 in. wide mounted against a wall are used for narrow or irregular washrooms.

Precast stone and marble are the most frequently used materials. Some models are also available in enameled iron and stainless steel.

Individual basins of vitreous china or enameled iron are satisfactory for comparatively small groups.

Mixing faucets are better than separate faucets for hot and cold water. Hot and cold handles should be plainly marked, with the hot water valve always on the left side. Thermostatic control of water temperature is desirable.

Faucets should permit washing in running water. Avoid stoppers.

Enameled troughs may be used where first cost is a consideration. Over these are hot and cold water pipes with mixing faucets spaced not less than 24 in. apart. Double-width troughs, or single-width troughs back to back, save space.

Spray heads at basins or troughs should be high enough to permit washing head, arms, and shoulders under the spray.

Showers are needed in many industries, particularly where operations are hot or dirty, or where toxic materials are used. Requirements depend upon nature of the processes. They range from 1 shower for every 5 men to 1 for every 15.

Shower installations may be of the compartment or the circular multi-stall type.

Floors and approaches should be of slip-resistant materials, such as concrete with an abrasive surface.

Dispenser for waterless hand cleaner with towel holder and receptacle for discarded towels. No plumbing connections are needed. (Sugar Beet Products Co.)

A curb 4 in. high should be erected around shower stalls, to keep water within the enclosure. With adequate slope to the drain a curb may not be necessary.

Painting the curb a contrasting color helps to prevent tripping.

Emergency showers. Quick-acting showers should be installed at convenient locations where caustics, acids, and other corrosives are handled.

Eye fountains are also desirable where chemicals are handled. Prompt flushing of the eyes is recognized as the best first-aid treatment for any chemical in the eyes.

Fungus infections. Warmth and moisture in shower rooms are conducive to the spread of fungi that cause "athlete's foot." Floors and stalls should be scrubbed daily with detergent and water as a general sanitation measure. A germicide in the scrub water is an added precaution.

Careful drying of the feet and use of an antiseptic foot powder help to prevent infection. Preparations for toughening the skin increase resistance to fungi.

Pans of antiseptic solution have been found ineffective or worse.

Disposable paper slippers or wooden clogs keep the feet from contact with the floor. They need not be worn in the stall where the floor area is kept mechanically clean by the flow of water.

Skin Cleansers

Four types of skin cleansers are in use: (1) Soaps (2) Sulfonated oils (3) Synthetic detergents and (4) Waterless cleansers.

Soaps. Powdered soaps consist principally of powdered hard soap and water softener, to which a scrubbing agent may be added. Cornmeal, a commonly used scrubber, may be coarse or fine. Most soaps can be used with hard water.

Organic solvents, such as naphtha, turpentine, and carbon tetrachloride, should be avoided. Some, particularly carbon tet, are toxic, some are flammable, and all have a drastic defatting action. If they must be used to remove substances like lacquer that resist ordinary cleansers, emollient creams help to offset loss of natural skin oils.

There is less waste with powdered soap than with cake soap.

—*To page 72*

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Heat and Humidity

BOTH CLIMATE and manufacturing processes provide complicated and expensive problems for industry. As temperature rises, discomfort increases, productive efficiency drops rapidly, and health may be affected.

Accident rates are also influenced by lack of alertness caused by excessive heat and humidity.

Serious year 'round exposures include steel mills, glass plants, foundries, and boiler rooms. Seasonal heat hazards (cold, too) are found in construction work, public utility, highway and railroad maintenance, and farming.

Above 90 degrees, the body rapidly loses its ability to compensate for atmospheric conditions, The effects of heat are intensified by high humidity and lack of air movement.

Some persons, of course, can stand more heat than others but it is good operating practice and good employee relations to keep the working spaces as cool as possible in summer and to shield workers from heat generating processes.

Air-conditioned comfort is not yet practical for many industries but other measures will often help. Ventilation comes first. Another method often used with flat-roofed buildings is to keep the roof sprayed with water. For operations where there is radiated heat, shields and insulation may be used.

Ventilation. Keeping air in circulation by general mechanical ventilation is helpful, and spot cooling by fans often increase comfort. However, when the wet bulb temperature of the surrounding air is higher than that of the body, blowing air over the worker makes him feel even more uncomfortable.

In industries such as hot mines, glass plants, and steel mills where heat is excessive, it is frequently useless to blow air over workers unless it is cooled and dehumidified.

Radiated heat. In some operations workroom temperatures cannot be kept below recommended limits. Radiation from hot objects presents difficulties in control. Radiated heat can be decreased by shields or insulation where fans would not be effective.

Adequate washroom facilities and plenty of cool, pure drinking water also offset the effects of hot surroundings.

Work clothing. For a hot humid environment, clothing should be porous, light in weight, and allow air to circulate around the body.

For exposure to local sources of intense heat and infrared and ultraviolet radiation, special protective garments are needed. (See Section 6).

Acute Ailments

Exposure to extreme heat, especially when accompanied by physical exertion, may result in heat cramps, heat exhaustion, or heat stroke.

Correct first-aid treatment for each type of ailment is important. All cases should receive prompt medical attention.

In general, the same precautions will help to prevent or minimize all types of disability due to heat.

Heat cramps are due to excessive loss of salt and moisture from the body. They come suddenly and may involve skeletal or intestinal muscles. Even if lost body moisture is replaced by drinking plenty of water, loss of salt may cause heat cramps.

How depletion of body salt through perspiration affects the individual.

Heat cramps are relieved in a few hours by proper treatment but soreness may persist for several days.

Heat exhaustion is a shock-like state also resulting from loss of salt and fluid. Symptoms are pallor, relatively low temperature, weak pulse, a feeling of restlessness or anxiety, and sometimes unconsciousness. It is much more serious than heat cramps and is occasionally fatal.

A person with either heat cramps or heat exhaustion should be given salted water, if conscious, and put under medical care as quickly as possible.

Heatstroke (or sunstroke) is caused by exposure to an environment in which the body is unable to cool itself sufficiently—not necessarily exposure to the sun. Body temperature rises and the heat-regulating mechanism breaks down.

Symptoms are severe headaches, flushed face, high temperature, visual disturbances, and loss of consciousness. If prompt treatment is available the patient has a good chance of recovery; otherwise death may occur within a few hours. One of the after effects is inability to withstand heat.

Sunburn can be painful and dangerous. In strong sunlight, the head should be covered and exposure of the skin kept at minimum. Tan should be acquired gradually. Treatment is the same as for any other type of burn.

Use of Salt

Maintaining the salt in the body at an adequate level enables men to work at strenuous occupations where temperatures are unavoidably high.

For sedentary workers, normal use of salt with food may be sufficient. However, those whose jobs require greater physical exertion may not consume enough by this method.

Dispensing. The most convenient and popular method for providing salt is in tablet form. The 10-grain size is more frequently used. Five types of salt tablets are available:

1. Plain.
2. Enteric coated. These pass through the stomach intact and dissolve in the intestines. They can be used by persons with sensitive stomachs.

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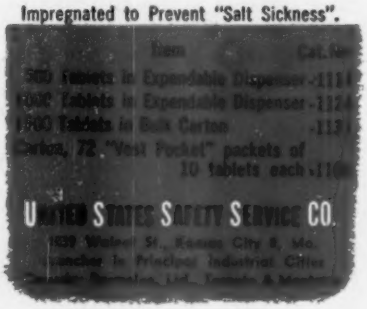

3. Impregnated. A network of inert material within the tablet prevents nausea by slowing down dissolution.
4. Combination. Contains 70% salt and 30% dextrose.
5. Enteric coated combination. Enteric coating over 30% dextrose tablets.

In plants where supplemental salt intake is indicated, a dispenser for salt tablets may be placed beside the drinking fountain. Dispensers are made in several styles and sizes.

Caution. Persons with kidney or heart disease or high blood pressure should not use salt without medical approval, and should not be placed on jobs where they would be exposed to high temperatures or heavy manual work.

Diabetics should be warned against tablets containing dextrose and plain tablets should be provided for them.

Water is as important as salt. A full glass of water (8 oz.) should be taken with each tablet.

Salt is sometimes added to the water where drinking water is not used in the industrial processes. Salt tablets may be provided in convenient pocket package for those whose work takes them away from the plant.

Salted drinking water should be used only under medical supervision. * * *

Air-Borne Bacteria

Control of air-borne bacteria is required sometimes by manufacturing processes, as well as for health reasons.

Ultraviolet radiation and chemical bactericides will destroy bacteria, but practical methods of application impose numerous difficulties.

Ultraviolet radiation, using low-pressure mercury lamps with ultraviolet transmitting glass or quartz envelopes, will destroy many micro-organisms.

Application is by irradiating the upper air stratum of a room, beaming or screening to provide a narrow barrier of protective light, or inserting a radiation source in an air duct.

Radiations of sufficient intensity to kill bacteria are injurious to eyes and skin. Lamps should not be in the range of vision.

Germicidal lamps must be used in fixtures designed for them. When used in ordinary lighting fixtures they will not function effectively and invisible ultraviolet energy generated by them can be harmful. Lamp wrappers warn purchasers not to look at lighted lamps.

Chemical bactericides. Propylene glycol is effective under most conditions. Effective concentrations are odorless and non-toxic to humans.

Their use requires close control of humidity.

Coolers for Hot Jobs

Operators of overhead traveling cranes often are subjected to extreme heat and humidity, as well as to gases, vapors, and dusts from operations below.

Cab coolers designed to improve conditions on such jobs are self-contained units that need only an electrical connection. They supply clean air, cooled and dehumidified, to the cab.

Locomotive cranes, which often operate in hot locations, can be provided with similar equipment. It can also be used to heat the cab in cold weather.

For pulpits and other control locations in steel mills where heat, dirt, or fumes create uncomfortable and hazardous conditions, similar equipment has been designed. * * *

Air conditioning units supply clean, cool dehumidified air to crane cabs and control locations in steel mills.

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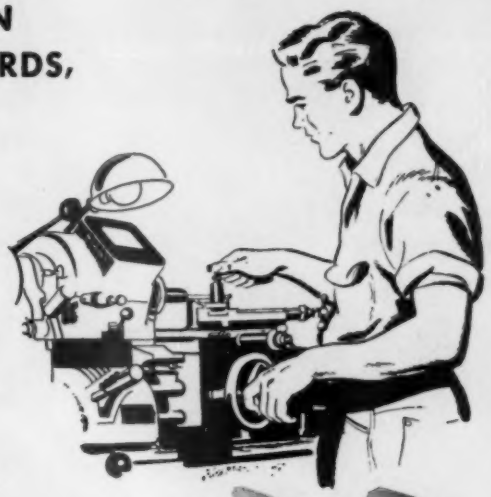

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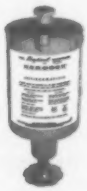

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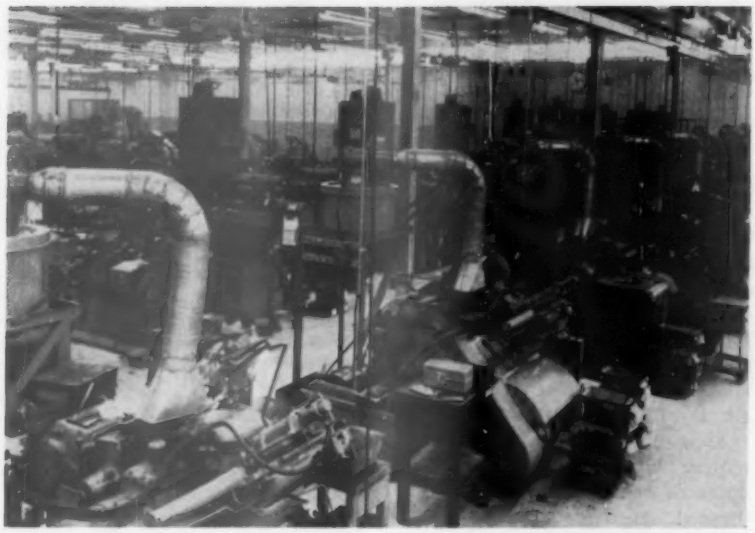

Mist eliminator to remove vapors from cutting oils. (Aget Manufacturing Co.)

Industrial Ventilation

Providing clean air for the workroom

CLEAN AIR is necessary for the health and comfort of those who occupy any enclosed space. For some occupancies, open windows may be adequate. For others elaborate exhaust systems may be needed to remove contaminants from the workroom air. Ventilation also includes control of heat and humidity.

Maintaining air hygiene requirements may be complicated by the generation of toxic or nuisance air contaminants in industrial processes.

Air pollution has become a problem for whole areas as well as for individual plants. In some regions, particularly those which are built up and where the topography does not permit quick dissipation of contaminated air, gases, dusts, and combustion by-products must be treated to make them safe and unobjectionable before venting to the outside.

Natural ventilation—air circulation through openings in walls unassisted by mechanical equipment—is satisfactory only when the building layout permits free circulation of air and where plant processes do not generate toxic or objectionable air contaminants.

Principles of ventilation. General ventilation systems are based on either of two general principles, or a combination of the two:

1. Plenum ventilation. Air is driven into the room by fans, diluting the room air with fresh air, forcing out stale air through doors, windows, and cracks. This method is limited to buildings where contaminants are non-toxic and present in low concentrations.

2. Exhaust (vacuum) systems. Air is drawn from a room by fans and is replaced by air entering through doors, windows, and other openings.

General Ventilation

Where processes are not injurious to health, general ventilation is usually satisfactory. It is also satisfactory where dilution of air contaminants will keep the concentration below Threshold Limit Values (T.L.V.) for continuous exposure. Standards for many contaminants have been compiled by the American Standards Association and the American Conference of Governmental Industrial Hygienists has suggested T.L.V. values.

Where contaminants are toxic, removal at their source is necessary.

Ventilation is often complicated by the necessity of maintaining a comfortable temperature. Exhausting impure air is usually practicable but in cold weather it may be difficult and expensive to warm large volumes of incoming make-up air.

Natural ventilation is adequate for some buildings housing non-hazardous operations. Air circulation is aided by doors, windows, roof ventilators, and monitors. The number of outlets should be planned for hot weather when the temperature difference inducing the draft is at the lowest point.

Air intakes should be located so that incoming air becomes properly tempered before reaching work areas and does not cause uncomfortable drafts in cold weather.

Artificial general ventilation requires properly located inlets and outlets. Air coming into the room must be uncontaminated and discharge points should be located to avoid recirculation.

Contaminant heavier than air can be removed most effectively through openings at floor level.

Fans and blowers. Both portable and stationary types are useful for increasing circulation of air which affords relief from heat. They are not substitutes for exhaust ventilation where air contaminants must be removed.

For moving large volumes of air, blowing is more efficient than suction.

Devices for air circulation become less effective as temperature and humidity rise.

Caution should be used in air movement, particularly with velocities over 200 fpm. When relatively cool air is blown over workers at high velocity, objectionable drafts are created. On hot jobs "man-cooler" fans can be used to create air movement of considerably more than 200 fpm with no problem.

Control Measures

Where there is a definite source of air contamination, general ventilation alone is seldom sufficient. Control involves three steps:

1. Identifying the substance and locating its source.

2. Atmospheric sampling to determine nature and extent of contamination.
3. Engineering control measures.

Control at the source may involve one or more of these measures:

1. Isolation or enclosure of the hazardous operation.
2. Local exhaust ventilation.
3. Operational changes; substitution of process or materials.

Isolation confines the operation to a definite location. Exposure is either eliminated or restricted to a few selected, trained, and equipped operators.

Installations which combine exhaust ventilation with isolation and enclosure include: sandblasting rooms, shakeout and tumbling-barrel operations in foundries, dry mixing, and mixing of volatile liquids.

Processes creating excessive heat, humidity, or noise should also be isolated wherever possible.

Local Exhaust Systems

Local exhaust systems are an important means of occupational disease control. Their purpose is to create a sufficient movement of air to withdraw contaminants at point of origin and convey them to a safe point for collection or disposal.

An exhaust system consists of four major parts:

1. Hoods or enclosures near source of contaminant.
2. Piping to connect hoods into system.
3. Collection equipment.
4. Fan or source of suction.

Dust is usually more difficult to control than gases, vapors, mists, and fumes. Dusty operations tend to project particles so that the hood must provide velocities sufficient to draw them into the exhaust system.

Exhaust hoods should enclose the process as completely as possible or the hood should be located to take advantage of the directional effects of the dust flow.

Dust-removal systems generally require higher air velocities and ducts of heavier gauge metal than those designed for gases.

Each part has its independent function but all must be designed to work together efficiently.

The exhaust hood is the most important part of the system. It should enclose the process as completely as possible. Air velocity decreases approximately with the square of the distance from the hood opening.

Air velocity for effective control varies with the process and material exhausted. Generally speaking, the better the enclosure and design of the hood, the lower the velocity needed.

Hoods or enclosures may be in the form of booths, canopies, lateral hoods, downdrafts through grill openings below the process, or slot-type hoods. The object is to remove the contaminant without drawing it through the breathing zone of the operators and with minimum interference with processing.

Hoods can be made more efficient by addition of flanges.

Ducts connect the hoods to the central fan. They should be designed so as to distribute the air flow in direct proportion to the requirements of each inlet, and maintain adequate pipe velocity to convey the contaminant to the point of discharge.

The system should be balanced so that each hood draws the proper amount of air. When this condition has been obtained, all means of adjustment should be permanently fixed. Areas of branch pipes and main ducts can be calculated to give correct air velocities throughout the system.

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LIMITS FOR VARIABLES INFLUENCING COMFORT AND SAFETY

(Ross A. McFarland in *Mechanical Engineering*, May 1954)

Variable	Desirable	Max or min value
Ventilation	Sufficient additional fresh or recirculated odor-free air to remove all odors	20 cfm of fresh air
Air Temperature	Ambient temperature adjusted to give effective temperature of 63-71 ET (winter) or 66-75 ET (summer)	70-72 F dry bulb
Air Velocity	Adjusted to ambient temperature to give appropriate cooling power without drafts	40-60 fpm
Humidity	Adjusted to air temperature and velocity to maintain comfort	25-50% relative humidity
Carbon Dioxide	Not a requirement as long as ventilating requirements for removal of odors are met	0.5-1.0%
Carbon Monoxide	None	0.003%
Noise	Conversation at least 3 ft with no extra effort	80-85 db over all; 50-60 db in 1200-2400 band
Vibration	Below threshold of perception	0.002 in. at 20 cps or more

Drinking Water

WATER constitutes a large part of the human body. Through elimination, perspiration, and breathing, this level is continually being depleted. It must be replenished frequently to maintain health, comfort, and efficiency. While the intake will be higher in hot weather, it is important throughout the year.

Water must be cool and palatable. Facilities should be located conveniently.

Clean, attractive fixtures are also important, particularly for women employees and for the public.

In planning installations these factors should be considered:

1. Number of persons to be served.
2. Type of work—light or strenuous.
3. Temperature of surroundings.
4. Purity of water.
5. Temperature of water.
6. Design of fixtures.
7. Location of outlets.

Requirements. One outlet for every 50 persons is a recommended minimum for industrial establishments. More will be needed where temperatures are high or work involves considerable exertion.

It should not be necessary to walk more than 50 ft. for a drink. If outlets are too far apart, employees will not drink enough, or they will spend too much time away from work.

All rooms assigned for eating purposes should have a supply of drinking water. No drinking facilities should be installed in toilet rooms.

Water supply. Health departments maintain a close watch over municipal water supplies. But when the plant is located outside the city limits, and for temporary operations such as construction, public utility, and oil field work, the employer must supervise the water supply. It should be analyzed regularly.

If unapproved or "service" water is used for industrial processes or for fire protection, signs should be posted warning against its use for drinking. Care must be taken to avoid possibility of cross connections between the two systems.

Sterilization. Water of questionable purity can be made safe for drinking by chlorination or boiling. Compounds for sterilizing water, some in convenient tablet form, are available.

Filtration is desirable for removal of sediment but it will not destroy harmful bacteria.

Temperature of water. For workers who perform heavy manual labor, from 50 to 55F. is recommended. For office workers, restaurant patrons and others who are less active, the temperature may be as low as 45 degrees.

Methods of Dispensing

Accepted methods of dispensing drinking water are:

1. Disposable paper cups provided at outlet.
2. Fountains of approved design.

Paper cups should be kept in dust-proof containers and receptacles provided for used cups. Containers must be kept filled or workers will salvage old cups.

Drinking fountains should conform to specifications of the *ASA Code Z4.2*. Important features are:

—An angle jet, which prevents the water falling back on the nozzle.
—A guard to keep the user's lips away from it.

Older installations in factories, offices, stores, and public buildings which do not conform to hygienic standards can often be modernized at reasonable cost.

Line strainers and pressure regulators are desirable accessories for drinking fountains. An outlet for filling glasses is also useful, particularly for office use.

Each cooler may be a unit in itself or a central compressor may serve several outlets.

Hazardous locations. For use where flammable gases, vapors, and dusts may be found, explosion-proof fountains are available.

Maintenance. Regular cleaning of porcelain and metal keeps fixtures attractive and sanitary.

A cuspidor or sand urn should be provided at each fountain to receive trash such as discarded chewing gum and cigaret butts.

Salt tablets. A dispenser should be located at each drinking fountain.

Isolated Jobs

For jobs remote from city water mains such as construction work, public utilities and railroad maintenance, mining, and other isolated working places, there are safe and convenient methods for providing drinking water. It is not necessary to depend on an open bucket with one cup for the whole crew.

Insulated coolers, with dispensers for paper cups are frequently used. The container should have a tight-fitting cover. Ice should not come in contact with the water.

Vacuum bottles for individual use may be provided for remote or hard-to-reach places, such as crane cabs.

Purification. If it is necessary to depend on a local water supply of uncertain purity, the water may be made drinkable by tablets available for this purpose. Manufacturer's instructions should be followed.

Salt tablets. In many remote locations, men perform strenuous work under the hot sun and perspire freely. Salt tablets may be issued in individual packages. • • •

Occupational Skin Diseases

SKIN DISEASES are a universal problem. Even substances normally harmless will cause irritations of varying severity in some skins. These ailments account for some 60 per cent of all compensation claims for occupational diseases.

While rarely a direct cause of death, these infections cause much discomfort and are often hard to cure.

Causes of occupational skin diseases are classified under five main headings:

1. Mechanical agents—friction, pressure, trauma.
2. Physical agents—heat, cold, radiation.
3. Chemical agents—organic and inorganic, subdivided according to their action on the skin as primary irritants and sensitizers.
4. Plant poisons—several hundred plants and woods can cause dermatitis; best known is poison ivy.
5. Biological agents—bacterial, fungus, parasitic.

Types of Action

There are two general types of chemical action on the skin:

1. Primary irritation dermatitis. Practically all persons suffer skin irritations from acids, alkalis, irritant gases, and vapors, and from physical agents, such as heat, cold, and friction. Brief contact with a concentrated primary irritant or prolonged exposure to a lower concentration results in inflammation.

Allergy is not a factor in these conditions.

2. Sensitization dermatitis is the result of an allergic reaction to a given substance. Once sensitization develops, even small amounts of the material may cause symptoms.

Some substances can produce both types of dermatitis. Among them are organic solvents, formaldehyde, and chromic acid.

Cutting Fluids

Cutting fluids are frequently involved in occupational acne. The condition starts with irritation of the skin by continual contact with the oil, forming comedones or blackheads. These comedones later become infected to form oil pimples or boils which resemble adolescent acne.

Careless workers contacting dirty oil is a combination that often results in occupational acne. Some types of skin are more susceptible than others, but anyone will develop oil acne with sufficient exposure.

If precautions are taken, oil acne can be prevented.

Machines and the area around them should be kept clean.

Oil should be changed and the machine thoroughly cleaned after about 120 hours of use. Oil may be reclaimed or replaced, depending on which is cheaper.

Reclaimed oil may be sterilized by heat during the process. Caution should be used in adding germicides. Most of them are irritants if permitted to become concentrated.

Oil dermatitis may occur on any portion of the body but most often where oil-soaked clothing rubs the skin. Hands, forearms and wrists are commonly affected.

Men should be encouraged to bathe at the end of the shift. A shower with warm water, mild soap or detergent, and a soft brush is helpful in the control of oil acne.

Predisposing factors. In investigating causes of skin disorders, consider:

1. Degree of perspiration.
2. Personal habits of cleanliness.
3. Pre-existence of skin disorders and allergic states.
4. Diet.

General Precautions

The following are useful in preventing occupational skin diseases:

Protective creams guard the skin against many industrial irritants.

Maintain good housekeeping around processes.

Provide appropriate personal protective equipment—gloves, aprons, face shields, protective creams, where necessary.

Encourage personal cleanliness to lessen contact of irritants with the skin.

Select a skin cleanser which can be used by most persons. Some sensitive skins may require special cleansers.

This article has been reviewed by Dr. Donald J. Birmingham, Chief Dermatologist, U. S. Public Health Service.

Air Conditioning Makes Climate to Order

Air conditioning has been defined as "the process of treating air so as to control its temperature, humidity, cleanliness, and distribution to meet the requirements of the conditioned space."

Control of temperature and humidity, as well as air motion and removal of contaminants, are necessary for a comfortable environment. This means cooling and dehumidifying workroom air in summer, and heating and humidifying it in winter.

Summer air conditioning now is almost universal in theaters and in even the less pretentious restaurants. Each year, more stores and offices are air conditioned. Sales of room air conditioners are increasing.

In industrial plants, temperature and humidity usually are influenced by the product's requirements, which may not coincide with the most comfortable conditions for persons.

More attention is being given to summer comfort and the possibility of raising human efficiency, which slumps seriously as temperature and humidity rise.

Temperature in the workroom shouldn't be too much lower than that outdoors—not much more than 10 degrees difference between interiors of buildings of public occupancy and the outside.

Air conditioning and modern lighting make a plant practically independent of the climate outdoors. A self-sufficient building may be windowless or, for psychological reasons, have fixed sash to give occupants a glimpse of the outdoors.

In addition to cooling and dehumidifying air in warm weather and heating and humidifying it in cold weather, the system should include a filter for removal of dust and dirt before circulating the air.

(RORSCHACH LIKE)

INK BLOT TEST:

TEST YOURSELF!

TURN THIS PAGE UP SIDE DOWN FOR CORRECT ANSWERS

G. H. PACKWOOD MANUFACTURING COMPANY, 1545 Tower Grove Avenue, St. Louis, 10, Mo.

So that you will never fail to have the correct answers to your skin cleansing needs . . . PAX supplies you with these three guides:

1. For really heavy, stubborn, difficult to remove soils, use PAX-LANO-SAV Granulated Skin Cleanser. Also it's 99.6% effective in the radiological decontamination of the skin.

2. For cleaning the baby—diaper rash—your face—all parts of the body—and grimy hands, use wonderfully gentle PAX PHARMACEUTICAL GRADE Waterless Skin Cleanser. Use it with or without water.

3. For a moisturizing skin treatment use PAX CREME SOAP—it's different—it's superior—it leaves the skin moist, vibrant, alive and velvety smooth — it's a deodorant — it's a modern washroom miracle.

560-B

Canteen operating around the clock serves some 2,500 employees daily. Disposable paper utensils are used for hot and cold dishes and drinks.

Food Service

MORE than half of the manufacturing plants in the U.S.A. now serve food to employees. Service ranges from vending machines dispensing hot coffee, soft drinks, and milk to cafeterias serving complete meals.

Plants with fewer than 250 employees represent nearly 96 per cent of the country's manufacturing establishments. Vending machines and disposable paper utensils have made it possible for many small concerns to provide food service.

Many companies set up lunchrooms and cafeterias because nearby restaurants are unable to handle peak crowds during the lunch hour and much time would be lost going to and from the job.

Types of Service

There are five main types of food service for industry.

1. Cafeterias preparing and serving hot meals.
2. Canteens or lunchrooms dispensing sandwiches and other packaged goods and hot and cold beverages. A few hot foods may be served.
3. Mobile canteens which circulate through the plant. Hot and cold foods and beverages are carried in vacuum containers.
4. Box lunch service.
5. Vending machines.

Vending machines dispense anything that can be packaged—soup, stew, chili, french fried potatoes, sandwiches, pastry, fresh fruit, and hot and cold beverages.

Modern machines are efficient in keeping foods hot and compact refrigeration units have been developed to chill foods. Disposable containers and electronic cooking on the spot have also expanded automatic service.

Vending machines are serviced by the companies installing them, relieving the employer of the responsibility of operation.

Few companies expect to make a profit from the service. The usual arrangement is to receive a percentage of the gross receipts which is turned over to employee recreation and benefit funds.

Disposable paper utensils for frozen or for hot foods have simplified food service. They eliminate dishwashing and breakage and made it possible to operate with a smaller staff.

Foam plastic cups provide insulation from hot beverages. Being seamless, the hazard of a scalded hand when a seam fails is eliminated. The foam plastic has practically no taste.

Some *plastic lined* paper cups have been known to ignite if a lighted cigarette is touched to them. Disposable utensils should be tested before ordering.

Vacuum insulated containers make it possible to carry hot foods prepared in a central kitchen to lunchrooms some distance away. This equipment is used by some large plants with scattered lunchrooms as well as by caterers.

Employees who bring lunches from home or buy box lunches may eat in locker rooms, if clean and well ventilated, or in work areas where processes do not make it undesirable or dangerous.

Management. Many companies have turned cafeteria and canteen operation over to caterers. Some large companies, however, do not like the idea of assigning management of the service to outsiders. If employees do not like the food or the prices the company, not the caterer, gets the blame. So they provide professionally managed plant cafeterias supervised by the personnel department.

For smaller companies, an industrial caterer is often the only practicable way. Foods are prepared in a central kitchen and transported to the plant. This avoids investment in kitchen space and equipment and maintaining the necessary staff. The employer provides the eating space and dishwashing facilities. Dishwashing is kept at a minimum by disposable utensils.

Sanitation

Wherever food is prepared or eaten, constant supervision is needed to maintain hygienic conditions. Incorporated communities have regulations governing food service to the public. In unincorporated areas, the state code or recommendations of the U. S. Public Health Service should be followed.

Use Bradley Washfountains in all of these locations

GROUPED IN LARGE WASHROOMS

Many can wash quickly and simultaneously in installations like the above—a dozen Washfountains.

IN LOCKER ROOMS

Such placement makes Washfountains readily reached from each employee's personal locker. Proper washing is encouraged.

Full circle model 54-in. and 36-in. diameters—precast stone, stainless steel—vitreous enamel pressed steel.

NEAR TOILET ROOMS

In this plant stainless steel Washfountains in groups of three are installed near toilets at each end of three factory floors.

FOR THE WOMEN

Washfountains are appreciated by the girls, either in wash and locker rooms, or in rest rooms.

Semi-circular model—same diameters and materials as full circle models.

NEAR CAFETERIA ENTRANCE

Semi-circular wall type Washfountains in corridors near cafeteria encourage cleanliness and save time.

FOR OFFICE STAFFS

More Washing Facilities in Less Space, and Lower Installation and Maintenance Costs

Throughout the nation Bradley Washfountains are in daily use in mill, mine and factory—recognized for the past 30 years or more for the economy, convenience and ultra-sanitary features that these group type fixtures provide.

There are no faucets to manipulate or maintain, no chance of collection of contaminating water in the big bowl since it is self-rinsing—and real economy of installation—*one set* of plumbing connections suffices for each *8 to 10* person Washfountain. And they cut washup time.

For new buildings and remodeling you can get both economy and the maximum in safe sanitary wash facilities with Bradley Washfountains . . . To have all necessary details write today for free copy of new Catalog 6002.

BRADLEY WASHFOUNTAIN CO., 2237 West Michigan St., Milwaukee 1, Wis.

THE SMALL WASHFOUNTAIN

The same ultra sanitary features of the larger Washfountains—foot control of water, faucets replaced by sprayhead, and self-rinsing bowl. Thorough washing with no faucet contacts.

They are used in office staff washrooms, first-aid rooms, visitors' and ladies' restrooms.

Bradley

BRADLEY *washfountains*

Write for Catalog 6002. No Obligation.

DRAEGER
MULTI-GAS DETECTOR

for "on-the-spot" readings!

THE DRAEGER MULTI-GAS DETECTOR provides an essential safety measure for many occupations—serving to trace and determine concentrations of *more than 30 gases.* Easy semi-quantitive gas estimations can be read at site of test, even by persons not analytical chemists, to save not only time but expense. This practical safety apparatus is a product of internationally known "Dragerwerk Lubeck" of Germany, one of the world's largest factories, and specialists for almost 60 years in respiratory equipment for safety purposes, diving, and the medical field.

Complete descriptive literature on request.

DRAEGER

In the U.S.A., contact: **DRAEGER OXYGEN APPARATUS CORP.**
432 Park Avenue So., New York 16, N. Y. — MUrray Hill 4-4390

In Canada, contact: **SAFETY SUPPLY COMPANY**
214 King St. East, Toronto 2, Ont. — EMpire 4-3234

Safety with Solvents

ORGANIC SOLVENTS of many types are used in vast quantities in modern industrial processes and for cleaning. The number of solvents now on the market is enormous and new ones are being developed. Practically all of them are flammable or toxic, or both.

The problem is to select the solvent that will do the job with the least hazard to personnel and property and surround its use with all possible safeguards.

Safety measures include ventilation, personal protective equipment, facilities for personal cleanliness, and medical supervision.

Solvents are used in various manufacturing processes to dissolve pigments, glues, plastics, and other materials. Another widespread use is to dissolve soil in cleaning equipment.

Animal and vegetable fats are readily dissolved by alkalis which combine with the fats to form soap, which is washed away with water.

Soil often combines dust, tars, and gums which are most easily dissolved by organic solvents.

Emulsion cleaners have to be used with water, which limits their use. Straight solvents are needed where water cannot be used, as on electrical equipment.

Organic solvents are those which contain the element carbon, and no metallic or basic element. They are classified in four main groups:

1. Hydrocarbons.
2. Alcohols.
3. Esters and ketones.
4. Chlorinated solvents.

In addition to solvent power, other properties may be important to the user. Flash point, toxicity, speed of evaporation, and cost must also be considered.

Properties of solvents. From the standpoint of safety the two most important properties are the flash point and the maximum allowable concentration.

The flash point of a volatile liquid is the ignition temperature of its saturated vapor. Expressed more simply, it is the temperature to which any material must be heated before it will give off sufficient vapor to form an explosive mixture with air.

Flash points given in most tables are determined by the closed cup method. These are always lower than those determined in an open cup.

Toxicity is measured by "maximum acceptable concentration" (MAC) in parts per million (ppm) of solvent that can contaminate the air in a room for extended periods without endangering the occupants. This term and "threshold limit value" are used interchangeably. The higher the MAC, the lower the toxicity of the solvent.

Speed of evaporation is also an important factor in toxicity. In addition to the rated MAC, the time it takes to reach that concentration must also be considered. A solvent of low volatility is generally less hazardous than one of high volatility with the same MAC.

Many efficient solvents are not safe for general use. Carbon tetrachloride, for example, is nonflammable but its fumes are highly poisonous. Benzol is too toxic and too flammable for general use.

References—Solvents

National Safety Council

Data Sheets:
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Benzene, 308.
Carbon Bisulphide, 341.
Carbon Tetrachloride, 331.
Industrial Ethyl Alcohol, 391.
Ethyl Ether, 396.
Ethylene Dichloride, 350.
Toluene and Xylene, 204.
Turpentine, 367.
Methylene Chloride, 474.

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Indispensable Flammables; Oct. 1959.

Keep Plant Air CLEAR of Welding Fumes

Welding shops equipped with Ruemelin Fume Collectors are assured of a clean, healthful atmosphere. Harmful fumes, heat and smoke are eliminated *at their source*, before they have a chance to spread throughout the shop. This lessens fatigue . . . improves working conditions . . . paves the way for increased plant production. Ruemelin Fume Collectors are approved by Industrial Commissions and insurance companies. Thousands in service. Available with 9 ft., 15 ft., 17 ft. and 20 ft. reach. Write for Bulletin No. 37-E.

RUEMELIN MFG. CO.

MFRS. & ENGRS. • SAND BLAST & DUST COLLECTING EQUIPMENT
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Circle Item No. 46—Reader Service Card

EYE WASHING FOUNTAIN

SAVE EYES!

Leading industrial doctors advise immediate washing with plenty of running water as the best first aid treatment for any chemical in the eyes. Records prove that washing with water for ten minutes or more, close to the accident, is necessary to reduce or eliminate eye damage.

Forehead operation leaves hands free to open eyelids so water can be directed wherever chemicals might be lodged. Sanitary white baked enamel bowl is resistant to most fumes.

Over 500 industrial plant installations have been made to date.

Write For Details.

VALVE
Chain Operated
Quick Action
Self-Closing

NEW EMERGENCY SHOWER

The B & A Shower is the quickest and most satisfactory way to saturate a worker with gallons of water the instant an accident occurs, to prevent a disfiguring burn—even a fatality.

Special shower head, no holes to clog—can be used where unfiltered water prevails.

Write For Details.

GLASS SLIVERS AND CHEMICAL IN EYES!

DISFIGURING FACIAL CUTS, AND BURNS!

CUTS AND CHEMICAL BURNS ON ARMS AND BODY!

THIS HAPPENS WHEN UNPROTECTED GLASS BOTTLES ARE BUMPED

NEW LOW COST B & A SAF-T-BAGS

are widely used for the safe handling of glass bottles containing harmful chemicals; also the storage and recovery of expensive serums, biologicals, and other costly products.

Painful cuts, disfiguring burns, loss of eyesight, or even a fatality, do result from corrosive liquid splash and flying glass when unprotected bottles shatter.

Write For Details.

5 PINT
1 GALLON
5 GALLON

BENSON & ASSOCIATES, INC.
P. O. Box 7542, Dept. N.S., Chicago 80, Ill.

This discussion is concerned chiefly with liquids used for dissolving grime and grease, rather than those used in complicated chemical processes. For cleaning, a wide range of petroleum hydrocarbons is available. Some are marketed under trade names or numbers. They are relatively nontoxic, with MAC around 500 and flashpoints up to 150 F. Best known of these are the Stoddard solvents with flashpoints of 100-120 F.

It should be assumed that all organic solvents are toxic. If used in any quantities, ventilation determined by an engineer must be provided.

Since solvents dissolve fats and oils, they naturally defat the skin. Workers in these processes should be provided with protective gloves and creams.

Manufacturers of solvents are glad to give the flashpoints and MAC's of their products, also advice on selecting a solvent for the job and suggestions for its safe use. * * *

Washrooms

—From page 58

Liquid soaps are generally satisfactory where a scrubber is not desired. They are frequently used in office washrooms and in first-aid rooms.

With either powdered or liquid soap in suitable dispensers it is easier to keep fixtures clean than with cake soap.

Soap should contain no free alkali and should show a low pH in dilute solution. This can be determined before purchasing.

Sulfonated oils are useful for dry and soap-sensitive skins. They are frequently used where workers are exposed to the defatting action of petroleum oils and organic solvents.

Synthetic detergents of several types, mild but effective, are particularly useful for removing oil, wax and tar.

Waterless skin cleaners are effective in removing grease and grime and newer types can be tolerated by most skins. The earliest waterless cleanser in general use was kerosene—alone or emulsified with ammonia soaps. Subsequently odor-

Circle Item No. 47—Reader Service Card

FOR SAFE
VENTILATION
IN MINES, TUNNELS, BILGES, MANHOLES
ABC NEOLON
Flexible Ventilation Tubing

Made from tough neoprene coated nylon. Can't tear. Wear resistant. Mildew proof. Yellow for visibility. Weighs fraction of metal vent pipe. Easy to couple, hang, store. 8" to 36" dia. All standard lengths. Also wire-reinforced NEOLON tubing for pulling out foul air. Send for catalog.

CUSTOM FLAME PROOFING ON FABRICS FOR SAFETY GARMENTS, WELDING CURTAINS, ETC. WRITE FOR DETAILS.

AMERICAN BRATTICE CLOTH CORP.
WARSAW, INDIANA
190 ARGONNE ROAD

TWO MEDICALLY APPROVED HAND CREAMS FOR INDUSTRIAL WORKERS

(1) **PH7 Protective Cream** is non-greasy, non irritating and non-sensitizing to the skin.

Applied before starting work, one application is effective for three to four hours against the following irritants: Lubricating oils, cutting compounds, synthetic resins, solvents, printing inks, paint, fibre glass, iron dust and chlorinated naphthalene.

(2) **Work Cream** is a soft, white hand cream which is applied after exposure to degreasing materials and at the end of the day's work to help keep the hands in good condition. Workers using solvents and other strongly degreasing materials will find Work Cream helpful in preventing roughness, dryness, chapping and cracking of the skin.

Cap type pump disenser available for use with one pound jar.

Write for full details.

LESTER L. BROSSARD CO.
540 N. Michigan Ave., Chicago 11, Ill.

Circle Item No. 48—Reader Service Card

WASHING FACILITIES

No. persons	No. washing facilities
15	1
30	2
50	3
Each additional 25 persons	1

With circular fountains, 17 in. of outside rim equals 1 lavatory.

(ASA Code Z4.1-1955)

less spirits and alkanolomines were used and now there is a variety of materials for the purpose.

Requirements include: Safety to hands; effectiveness of cleansing; absence of disagreeable odor; pleasant appearance and after-feel; suitable consistency for dispensing; rapid break when on the hands; and stability to heat, cold, and storage.

Portable dispensers with receptacles for waste towels can be set up quickly. No plumbing connection is needed. Dispensers for paper towels can be attached.

Waterless cleansers are not substitutes for soap and water but they are convenient and efficient for specific uses.

Germicidal cleansers. Ordinary soaps and synthetic detergents remove transient bacteria from the surface but do not reach those embedded in the skin. Many germicides, such as phenol compounds, have been tested as ingredients of

Emergency shower outside laboratory will rapidly put out flames in burning clothing or flush off acid splashes. Eye fountain at right washes fumes and corrosives from eyes. (Geigy Chemical Corp.)

ŌNOX®

SKIN TOUGHENING PREVENTS ATHLETE'S FOOT

Skin specialists say the best way to prevent Athlete's Foot is to increase the skin's resistance to fungus growth.* That's what Onox does. It keeps shoe-softened skin as tough and healthy as your hands.

Onox has been used for many years by clubs, schools, and over 70% of the largest U. S. companies for the treatment and prevention of Athlete's Foot.

*American Pub. Health Assoc., Oct. 26, 1954

new footsprayer CUTS COST 50%

60-DAY TRIAL OFFER

includes Footsprayer and solution

If you are not completely satisfied after 60 days use, you pay nothing . . . just return the sprayer freight collect.

Easy to use.
Bathers step on treadles.
Four jets spray feet.
Sanitary, easy to keep clean.
Uses only half as much solution as the sponge footmat.
Reduces cost to 1/10c per treatment.

Write for FREE brochure with complete information including medical opinions.

ONOX INC.
Dept. A, 121 Second Street, San Francisco 5, Calif.
Warehouses: Cleveland • Jersey City • New Orleans • Newark, Calif.

TOILET FACILITIES

No. persons	No. toilet bowls
1 to 9	1
10 to 24	2
25 to 49	3
50 to 74	4
75 to 100	5
Over 100	1 for each additional 30 persons

(ASA Code Z4.1-1955)

skin cleansers, but required concentrations that made them unsuitable for daily use.

Hexachlorophene, described by various trade names, has received wide medical approval. It is now used in soaps and detergents for medical, surgical, and deodorant purposes and for general industrial and home use.

Drying the Skin

Paper towels meet sanitary requirements and are economical and convenient. Dispensers should be kept filled and receptacles for used towels provided.

Recessed waste receptacles take one more object off the floor, improving the appearance of the washroom and making cleaning easier.

Mechanical hot air driers are acceptable from the hygienic standpoint. Popular types are foot-operated and may be of the pedestal type or recessed into the wall. Equipment should be well grounded and the electrical connection permanently installed without extension cords or plugs.

Towel services are used by some establishments, usually stores and offices. For industrial use, individual towels kept in lockers may not be changed often enough and they may come in contact with soiled work clothes.

Toilets

Toilets should be partitioned off from washrooms and lockers. Partitions of enameled metal are attractive in appearance and easy to keep clean.

Wall-hung equipment—lavatories, toilets, urinals and partitions—provides an unobstructed washroom floor. This permits rapid hosing down and mopping and eliminates corners that harbor dirt and make cleaning difficult.

Off-the-floor fixtures, of course, are not always practical, particularly in modernization, where existing drainage lines must be used.

The oval-rim type of toilet with open-front plastic seat is most widely used. Foot-operated flush valves are favored by many.

The flushing mechanism should be rugged since employees often kick the handle instead of operating it by hand. Flush valves should be equipped with vacuum breakers to avoid back siphonage.

Toilets should be not more than 200 ft. from any work place; preferably less than 150 ft.

Facilities for men and women should be plainly marked.

One toilet enclosure in each washroom should be reserved for the slop sink.

Urinals should be placed in convenient locations to avoid loss of time. One urinal for each 40 men is usually sufficient. Automatic flush valves use more water but are more effective in maintaining cleanliness since many persons seem reluctant to touch hand-operated valves.

THE SOLUTION TO AN OLD INDUSTRIAL PROBLEM

Contact Dermatitis

SILCONEX (77% silicone) is the most universal skin ointment now available. It protects not only against water dissolved materials but also against solvents and oil-solvent—water—chemical mixtures. It resists exposure to strong acids and alkalis, oxidizing agents, salts and other chemicals whether in water or organic solution. It prevents initial sensitization by allergens. It is non-conducting and therefore useful in electronic operations. Simple to apply, one or two applications a day provide ample protection. It has an important place as the most universal weapon against contact dermatitis.

CLEREX & H-R CREAM SOLVENT PROTECTION protect the skin against organic solvents. They wash off with soap and water. CLEREX is a gel which forms a continuous, strong, elastic skin-adherent film which does not interfere with tactile sensation. The film is insoluble in all anhydrous organic solvents, oils and greases. It protects against the hydrocarbons (benzene, benzol, toluene, gasoline, varsol turpentine, kerosene, solvent naphtha), the chlorinated hydrocarbons, nitriles and the polymerizable monomers (styrene, acrylonitrile, and unsaturated esters for producing polyester resins). Used in making and using paints, varnishes, plastics, polyester resin—fiber-glass compositions, lacquers, inks, and in metal degreasing using trichlorethylene. H-R CREAM is a modification of CLEREX with a vanishing cream base. It is highly resistant to the materials listed under CLEREX. It is useful where protection must be applied to the face and arms as well as the hands. It has proven highly effective against phenolic vapors, creosote, extreme exposure to coolants, tars, rubber-asphalt and rubber-tar mixtures, petroleum oils, plastic and adhesive compositions.

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Floors of toilet rooms should be of impervious materials, smooth and free from cracks. Tile and concrete are satisfactory. Floor drains permit frequent flushing.

Toilet rooms should have outside windows for light and ventilation if practicable. State or municipal regulations usually contain provisions for ventilation.

Switches for lights, electric driers or other equipment should be located so they cannot be operated by a person in contact with piping or other grounded conductor. Pull chains should contain an insulating link close to the fixture.

Cuspidors or sand urns should be provided where needed and cleaned at least daily. The disposable type requires less handling.

Lockers

A well-equipped locker room is an aid to orderly habits and occupational hygiene.

Locker rooms should be fire-resistant, separated by fire walls from the main building.

Ceramic tile walls and terrazzo floors make this shower installation easy to keep clean. Foolproof equipment controls water temperature.

Exposure to toxic substances calls for extra precautions to prevent contaminated clothing leaving the plant. Separate lockers prevent contact between street and work clothes. They should preferably be in separate rooms with shower stalls between them.

Supervised washup periods and shower baths are needed wherever poisons are handled.

Sloping tops on lockers prevent use for storage. Dust is conspicuous and easier to remove than with flat tops.

Built-in lockers extending to the ceiling avoid dust-catching surfaces.

Lockers should be at least 4 in. off the floor to permit flushing the floor without wetting the contents of the lockers.

Forced ventilation, through perforations in the bottom of the lockers or through louvers in the doors, helps to remove odors. If the work is heavy or wet, circulation of heated air through the lockers is desirable.

Oil-soaked clothing, waste, or newspapers kept in lockers may create a serious fire hazard. Lockers should have solid fire-resisting sides

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and backs, but doors should have louvers for ventilation. Employees should not be permitted to leave clothing or rags saturated with oil or paint in lockers.

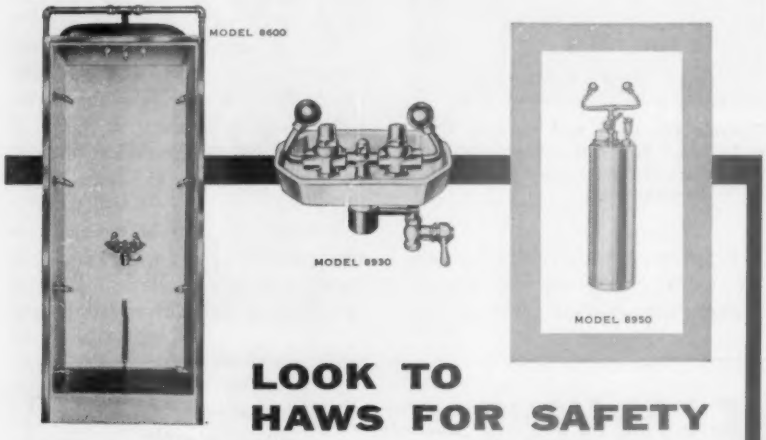
Baskets and hangers on elevating chains are used instead of lockers in some industries, such as mines and foundries. Damp work clothing can be dried between shifts and drying can be hastened by steam coils at the ceiling. This arrangement conserves floor space.

Rest Rooms

A rest room should be provided where 10 or more women are employed. Where there are fewer women and a separate room is not available, suitable space may be screened off.

For 10 women, minimum space is 60 sq. ft., with at least 2 sq. ft. for each additional woman employed.

For less than 100 women, at least 1 bed or couch should be provided. For 100 to 200 workers, 2 beds, and 1 bed for each additional 250 workers. * * *



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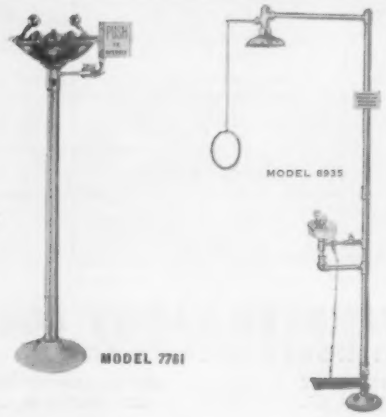

Ventilation

—*From page 64*

Material used for ducts must resist abrasive action of dust or corrosive effects of gases and vapors.

Sharp turns in ducts take extra power and cause a large pressure drop. In addition, any particulate matter in the air stream will collect where sharp changes in direction occur and eventually plug the duct.

Traps with clean-out gates should be provided at the bottom of vertical runs, and clean-out gates at regular intervals on the bottom side of horizontal runs.

Fans should have a capacity slightly higher than calculated requirements to allow for leakage in the system, accumulation of material on fan blades, and similar difficulties.

Where the contaminant is hot and has a natural tendency to rise and the operation can be provided with an effective enclosure type hood, natural draft ventilation is often satisfactory.

Portable ventilators are used for supplying fresh air to confined spaces for temporary work. Examples are tanks, tank cars, vats, underground cable manholes, pipe galleries, ship holds, and airplane wing compartments and fuselages.

Where objectionable fumes are produced, as in welding under some conditions, ventilators exhaust contaminated air.

Disposal of Contaminants

Equally as important as collecting the air contaminant is its disposal. Gases, vapors, and mists may often be discharged to the outside atmosphere at a point where they will not recirculate around the premises in harmful concentrations.

Dusts, both harmful and nuisance, require the use of dust collectors in the system.

Recirculation of air is generally undesirable, particularly when the air has contained gas or fumes. Where only nuisance dusts are involved, recirculation after cleaning is often permissable.

Recirculation is not desirable

when handling dusts containing such substances as lead, silica, and asbestos.

Air coming from the cleaning device must fall within the permissible range for toxic or flammable dusts.

Dust Collectors

Methods of removing dust from the air exhausted by the system include:

1. Filtration.
2. Electrostatic precipitation.
3. Wet collectors.
4. Dynamic precipitation.
5. Supersonic flocculation.

Filters are porous mediums through which dust-laden air is drawn. Some are designed to collect dust in the form of a layer on the upstream surface. This is characteristic of cloth and paper filters. Thicker types, such as those of metal mesh or glass fiber treated with oil, have greater dust-holding capacity but do not collect the finer particles.

A filter should have:

1. Low initial resistance to air flow.
2. Reasonable length of service.
3. Efficiency under changes of temperature and humidity.
4. Low flammability.
5. Reasonable replacement cost or ease of cleaning.
6. Low maintenance cost.
7. Freedom from odors.

Electrostatic precipitation is highly efficient—particularly for fine dusts which are difficult to remove by other methods. It offers low resistance to air flow. First cost and maintenance cost are relatively high.

Portable units are helpful in removing dust and smoke from small rooms.

Precipitators are less effective in collecting large particles moving with considerable force. For high concentrations of dust they generally require pre-cleaners. They are valuable when the process requires a practically dust-free atmosphere.

A combination of viscous filter and electrostatic precipitation with a self-cleaning feature is used on some models. It solves the problem of dust capacity and of heavy particles.

Cyclones. A cyclone consists of an outer cylinder fitted with an inverted cone-shaped hopper and an inner concentric cylinder which serves as a discharge duct. Air from the main duct of the exhaust system, under high velocity, enters the large chamber where the air is given a circular motion. The heavier particles are thrown to the outer wall by centrifugal force and fall along the wall. Air escapes through the top.

Cyclones are the most effective for large particles, such as sawdust, shavings, or heavy lint. After passing through them, air cannot be returned to the workroom without further filtering. Cyclones are relatively inefficient for removing small particles.

Multiple small diameter cyclones of small taper collect finer particles than the common large diameter ones, mostly because of higher velocities and greater centrifugal force.

Dynamic separators combine fan and collector in one unit. This type

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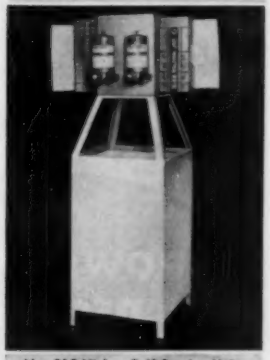

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of separator is somewhat like a cyclone, but the centrifugal separating action is performed by the revolving blades. It is more efficient than the cyclone.

In some types water spray is introduced with the dust at the inlet. Wet collection increases efficiency for fine dusts.

Wet collectors use several devices for obtaining contact of water with the exhausted air so that dust particles form a sludge. One type consists of sprays or water curtains through which dust-laden air is drawn. These are efficient collectors.

An important application is in the prevention of dust explosions from grinding aluminum or magnesium.

Supersonic flocculation. Suspended dust is passed through a field of supersonic vibrations, inaudible to the human ear, generated by a high-frequency siren. Vibration flocculates the fine particles, and the aggregates are then collected by cyclones or other measures for collecting relatively coarse particles.

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General Measures

Personal protective equipment is needed where exposure is occasional or where complete protection is not practicable. Removal of the hazard at its source should remain the objective.

Sanitation and maintenance must receive constant attention to keep equipment at top effectiveness and prevent development of unhygienic conditions.

Supervision and training of employees, particularly in hazardous operations, are important.

Medical control is an important check on other methods. Engineering control is sometimes inadequate and symptoms of absorption of toxic materials by a worker may be the first real warning.

The safety department should be notified of the introduction of new materials and processes so possible hazards may be assessed and safeguards provided.

Workers exposed to toxic substances should have frequent physical examinations. * * *

Air Force Gives Safety Stronger Stress

The Air Force has announced that it is giving increased emphasis to accident prevention by upgrading ground and missile safety programs to the level of directorates. With the new organization the Air Force has four directorates in the safety field. All are under the command of Maj. Gen. Joseph D. Caldara, deputy inspector general for safety. The four directorates are Flying Safety, Ground Safety, Missile Safety, and Nuclear Safety. Nuclear safety is organized under Colonel Charles B. Stewart, ground safety under Colonel W. L. Tubbs (Ret) and flight and missile safety under Brig. Gen. Walter E. Arnold.

The Air Force's ground safety program has been paying big dividends, according to General Caldara. He pointed to the fact that personnel who take the 10-hour driver safety course can now receive a 10 per cent reduction in their auto insurance payments from many companies.

The driver training course is mandatory for all Air Force personnel under 25 years of age.

SECTION 4

NOISE CONTROL

IN SECTION 4:

Engineering and Medical Control 80

Personal Protection 82

Selling Ear Protection 85

Modern Aids to Better Hearing 85

MODERN LIFE is hard on the ears. On and off the job, they are taking more punishment now, and industry is being handed a large part of the bill.

But compensation payments are only part of the total cost. Increased fatigue and susceptibility to accident are not easy to figure, but they have a definite connection with noisy surroundings. And noise from nearby industries and street and highway traffic depresses property values.

There are two methods of control—engineering and medical. The first deals primarily with the environment; the second with protection and supervision of the employee. Both methods may be needed.

Noise Control

Engineering and medical measures to protect hearing

SOUND is a normal part of our environment. Most of it, fortunately, is pleasant and comforting. A world without familiar sounds would be mentally disturbing.

Our world also contains "noise," which may be defined as "unwanted sound." Noise may be objectionable because of intensity, pitch, rhythm or quality. Reaction to rhythm or sound quality is sometimes a personal matter; what may be noise to one person may be music to another.

Noise may or may not be harmful to hearing, depending on its character and the conditions of exposure. Noise is a problem to industry for four general reasons:

1. Some types of noise may injure the hearing of those exposed.
2. Compensation claims for hearing loss attributed to occupation.
3. Noise may be a contributing cause of accidents through interference with voice communication or warning signals, or through creation of nervous tension and fatigue.
4. Effect on public relations through raising community noise levels and establishing the plants reputation as a noisy place to work.

Components of sound are:

1. Intensity, related to loudness.
2. Frequency, related to pitch.
3. Quality, or timbre.

This article has been revised by Roger B. Maas and Robert Young of Employers Mutuals, Wausau, Wis.

Measurement of Noise

Intensity, or loudness, is measured by a sound level meter, commonly called a noise meter. It consists of a microphone, an amplifier, a calibrated attenuator, three frequency response networks controlled by three taps, and an indicating meter.

The unit of sound measurement is the "bel," or more commonly, the "decibel" (db), which is one-tenth of a bel, named in honor of Alexander Graham Bell. A level of zero decibels represents roughly the weakest sound which can be heard by a person with very good hearing.

Noise levels produced by familiar sources of sound are shown in Table I.

Frequency and quality. The sound level meter measures only weighted or unweighted sound pressure. For a more complete description of sound, measurements must also involve frequency.

Different types of noise have different effects on the hearing mechanism. Noise of high intensity is believed to be more injurious to the hearing when it is of high frequency than when the frequency is lower.

Making a sound level survey in a noise-making department. Several types of instruments are available for these tests. (Allis-Chalmers Manufacturing Co.)

A locomotive whistle, for example, produces a sound of low frequency, while air escaping from the air hose produces a sound of high frequency.

Two sounds of identical intensity and pitch may vary appreciably in the annoyance they cause due to differing harmonic make-up or quality.

Data on distribution of sound pressure as a function of frequency may be obtained through measurements made with a sound level analyzer. Several types of analyzers are available; the choice will depend on the use to which the data will be put.

The most practical and widely used analyzer for measuring industrial noise is the octave band analyzer This instrument provides for measurement of sound levels in eight frequency bands. The data obtained is sufficient for evaluating noise exposures for potential damage to hearing and the time required for the analysis is reasonable for field work. For some engineering purposes, analyzers having narrower band widths are used for more precise scanning of the noise spectrum.

Critical levels. Limits for injurious noise are still vague and uncertain. The whole problem of noise control requires much more research and evaluation.

Noise levels above 130 db. may cause permanent damage to normal ears, even after relatively short exposure. This limit represents the

TEN STEPS TOWARD NOISE CONTROL

1. Make a noise level survey.
2. Analyze each machine and location; determine source of noise, and keep an accurate decibel count of each machine's noise output.
3. Appoint a specialist to study the problem. He should be directly responsible to management.
4. Call in outside consultants.
5. Check new equipment for quietness in operation.
6. Keep old equipment in efficient operating condition.
7. Substitute quieter operations where practicable.
8. Consider possibility of isolating noisy processes.
9. Check locations where sound-absorbing materials might help.
10. Use ear protective devices where other methods are not practicable.

TABLE 1
Scale of Representative Sounds
(Decibels)

Zero Reference	0
Whisper	20
Low Street Noise	40
Conversation	60
Heavy Traffic	80
Subway	100
Airplane	120
Jet Engine	140

pain threshold for many persons.

In determining critical levels, actual intensity of sound is not the only factor. The following are also important:

1. Frequency of pitch.
2. Total length of exposure.
3. Length of exposure period.
4. Whether sound stimuli are continuous or interrupted.
5. Length of interruptions.
6. Type and space of environment, with reference to reverberation.

In addition to these environmental factors, the age of the individual and his record of previous trouble should be considered.

Plant operations should be tested with an approved sound meter and octave band analyzer, and a record of noise levels compiled by departments. This refers to levels more or less continuously present, not occasional high-intensity noise.

If a sound level meter is not available, an approximate idea of the noise intensity may be obtained as follows: Walk through the plant with a person having normal hearing and try to carry on a conversation. If shouting is necessary, the sound level is usually higher than 90 db.

Methods of noise control fall into two classes: (1) engineering; (2) medical.

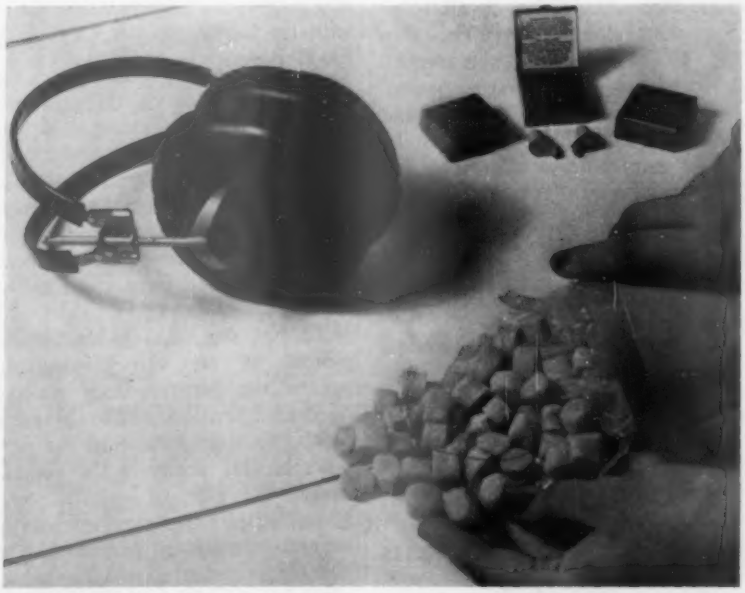
Engineering Control

Methods for reducing the noise level may be classified as follows:

Control at source. The most fundamental attack on noise hazards is removal at the source. With good engineering design much noise can be eliminated. Many industrial machines and home appliances have been greatly quieted by improved design.

This approach will usually be the responsibility of the machinery manufacturer, although it is possible to modify equipment already in use in some instances.

Lack of balance in rotating machines can set up vibrations which are magnified by other parts. Resilient materials can be used for parts which are causing noise. Machinery covers can be damped with undercoating material.



Types of ear protection used at Lockheed Aircraft Corp. Above are helmets, earplugs, and balls of cotton and wax molded by user.

Automatic audiometer used in connection with audiometric examination room. (Industrial Acoustics Co.)

Much unnecessary noise results from worn and improperly maintained machines. It is important, therefore, that machines be kept in good operating condition.

Substitution. Another method of control is to substitute a less noisy operation, if possible. Spot, arc, or flame welding may be substituted for riveting in some operations. Application of this method is limited but it should be considered.

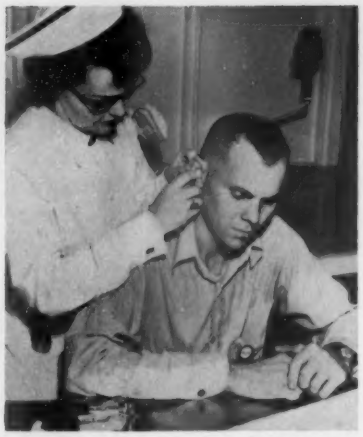
Isolation. Frequently noise can be isolated so its disturbing effect will be encountered by fewer people. A noisy machine may be placed where only employees necessary for the job are exposed. Isolation, however, does not help the men who must work in these areas. They should be provided with ear protectors.

Well-insulated partitions and tightly-closed doors, preferably of the refrigerator type, should be provided between a noisy room and adjoining areas.

Reducing time of exposure is also helpful. Noisy processes should be made as automatic as possible, so that workers can retire to a quieter area at frequent intervals. Quiet surroundings should be provided for lunch and rest periods.

Reducing vibrations. If heavy machines are firmly bolted to concrete or wood floors, the floor often becomes a huge sounding board. This not only amplifies the original noise volume but helps spread the noise throughout the entire building.

Resilient mountings of various types will usually reduce both vibra-



Ear openings differ in size, and plugs must be fitted to the wearer for effective protection. Fitting is best done by a doctor, nurse or technician.

tion and noise. Resilient floor coverings further reduce the noise level. However, vibrations transmitted through the base of a machine and radiated as noise from a floor is, in most cases, predominantly low frequency. Since industrial noise is commonly most objectionable at higher frequencies, reduction at lower frequencies by isolating mountings for machines is not as important as sometimes assumed.

Many types of vibration insulators are available commercially. Because each machine is a problem in itself, engineering advice should be obtained.

Sound-absorptive materials are extremely useful for controlling noise in buildings. Hard surfaces, such as plaster and brick walls, reflect sound and cause reverberation. Sound may come from several directions and travel long distances apparently undiminished.

A remedy is the absorption of high frequency sounds by the application of acoustical materials. Sound absorbents may be applied to ceilings and walls in the form of acoustical tiles, plasters, sprayed-on compositions, and blankets prefabricated from porous material, such as glass wool.

Where structural treatment is not practicable, acoustical baffles suspended from the ceiling bring a substantial reduction in noise levels.

Acoustical treatment does not lessen the direct noise of machines but is highly effective in decreasing indirect or reflected noise.

The problem of sound control by acoustical treatment is far from simple. To get results from the investment the installation should be planned by experts in the field.

Personal Protection

In some industrial operations the best sound control measures now available still leave the noise level too high for safety. The outstanding example of this situation is in the testing of jet engines.

In such cases operators should be protected with properly designed and fitted ear protectors which will reduce the intensity of the sound reaching the hearing mechanism.

Types of devices for ear protection available commercially are:

Molded plugs are made of neoprene, vinyl plastic or rubber and inserted in the ear canal. These plugs are easily cleanable, and neoprene and vinyl are resistant to ear wax. Plugs should be smooth, with no abrasive action on the external canal. They should be fitted by a trained technician.

Muffs should fit the head snugly and be free of projections which could catch on machinery or structures. They must be easily cleanable and not cause undue pressure or perspiration at pressure points.

Helmets reduce sound energy transmitted to the bones of the head. The face should be covered for maximum effectiveness. The firm type of helmet, similar to a football or crash helmet, is rather warm, cumbersome and hard to get on and off. Soft cloth helmets containing muffs are more comfortable and provide adequate protection at moderate levels.

TABLE II
Common Industrial Noise Levels
(Range in Decibels)

Spinners, looms, lathes	80-95
Screw machines, punch presses, riveters, cutoff saws	90-95
Planers, routers, sheet metal, speed hammers	110-115
Drop hammers, chipping hammers	110-125

Combinations of ear plugs and muffs or helmets give 3 to 5 more decibels of protection than either worn alone. They are used for intimate exposure to jet noise.

Waxed cotton plugs. Balls of wax and cotton are molded by the user to fit his ear canals. This is effective protection for most exposures. These plugs should not be confused with wads of untreated cotton which offer little protection when stuffed in the ears.

Amount of protection. Good devices generally reduce the noise reaching the ear by 25 to 35 db, varying with design.

Individual ears and preferences differ considerably. It is advisable to have several types of devices on hand and let the user choose the type.

Well-fitted ear plugs provide protection against sound levels up to 130-135 db under most circumstances, even where exposure is prolonged.

Medical Control

Where processes are noisy, engineering control methods should be supplemented by medical supervision. A record of each employee's hearing should be kept, with periodic tests to detect possible deterioration.

Many companies now measure a new employee's hearing acuity along with his height, weight, vision and blood pressure.

The audiometer is the standard device for testing hearing. This instrument produces tones of the purity and intensity required. One pure tone at a time is presented through receivers to the person under test. The weakest intensity he can hear is then recorded on a chart called an audiogram.

The hearing level in decibels is plotted on the vertical ordinate against the log frequency on the horizontal ordinate. This gives a quick, accurate picture of the person's hearing acuity in the audible range.

Audiometer tests may be made by trained non-medical personnel. The hearing program should be supervised by a physician.

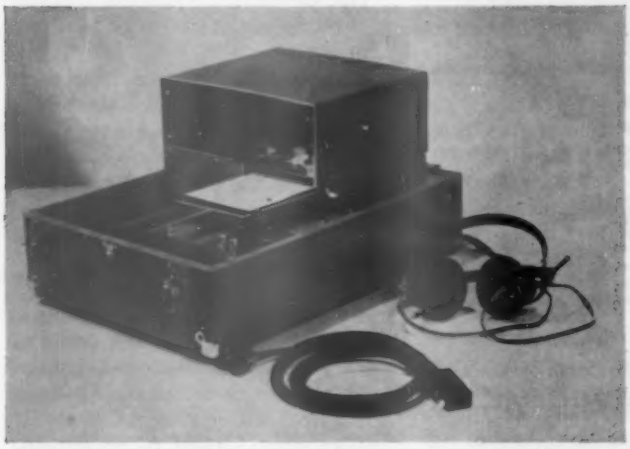
Routine audiometer tests are ad-

IAC Your Standard of Silence

Sounding Board

News of Interest in the Field of Noise Control

Automatic Audiometers Simplify Effective Hearing Conservation Programs



The new Rudmose ARJ-4 Automatic Audiometer now being distributed by Industrial Acoustics Company, Inc.

Audiometers which are completely automatic and which allow the subject, after a short instruction period, to control his own hearing test are making it possible for more and more companies to institute effective Hearing Conservation Programs.

With most states recognizing hearing loss as a definite compensable item in workmans' compensation cases, the presence of a Hearing Conservation Program has become a must where the working environment can lead to loss of hearing among employees.

Audiometer Just One Factor

The automatic audiometer which simplifies the actual hearing test is just one factor in an overall Hearing Conservation Program. To be completely effective, the program must take into account all factors which tend to affect hearing loss.

In the case of a noisy environment, attention must be paid to reducing the noise level. This can be done by either isolating noisy equipment through the use of complete or partial machinery enclosures or by protecting personnel with "Quiet" Rooms which shield workers from damaging noise.

Examination Rooms Important

The first step in any Hearing Conservation Program, the pre-employment hearing test, must be completely reliable in order to determine the hearing ability of the employee at the time of hiring. To insure a reliable test, the use of an Audiometric Examination Room is recommended.

An IAC Audiometric Examination Room, when used in conjunction with the Rudmose Automatic Audiometer, assures a proper testing environment for obtaining accurate and valid audiograms. A complete hearing test takes only six minutes and the subject conducts his own pure tone test. Circle 14.

Subject conducts his own hearing test seated within an IAC Audiometric Examination Room.

A machinery enclosure helps control noise levels by isolating noisy equipment.

"STEEL CLAD" TELEPHONE BOOTHS KEEP NOISE OUT—CONVERSATION IN

Wall Model "NOISHIELD" Telephone Booth installed in a machine shop.

A new line of telephone booths, acoustically engineered to provide ease of conversation in noisy locations, or privacy of conversation where desired, has been introduced by Industrial Acoustics Company, Inc.

The IAC "NOISHIELD" Telephone Booths feature high acoustic efficiency, rugged "steel clad" construction and attractive finishes at low cost. They are available in both wall and floor models and can accommodate pay phones, hand-set phones or "inter-com" equipment. Circle 15.

See Us in Rochester:

You are cordially invited to visit the IAC Display at the Industrial Health Conference, Rochester War Memorial, April 26 to 28, Booth 308.

New literature available:

Complete data on "Acoustic Doors" and "matched" Frame Assemblies. Circle 16.

Details on the use of Acoustic Panels for shields, partitions and soundproof enclosures. Circle 17.

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visable at regular intervals, in addition to pre-placement tests.

Audiometric readings will determine the effectiveness of protective devices. The audiogram must be recorded prior to initial noise exposure and repeated at intervals determined by the findings and level of the noise exposure.

Careful pre-placement and periodic audiograms will detect progressive hearing loss and indicate the effectiveness of the program.

Selling Ear Protection

PUTTING ACROSS a hearing protection program is one of the toughest selling jobs required of a nurse or safety man. Use of ear plugs is increasing, though not without discouragement. Ear protection is a long-range educational project, because the average worker accepts noise as a normal part of his job and is not too worried about the damage he may suffer 15 or 20 years hence. He will seldom continue to wear protection unless noise levels are excessively high or annoying.

Industries, insurance companies, and other agencies are constantly seeking new hearing protection, and new methods of making each man realize what he stands to lose if he does not protect himself now. Some day, it is hoped, the effort will be equal to that of eye protection.

Ear protection is still somewhat new, and loss of hearing is a gradual type of injury. It lacks the dramatic elements of the loss of an eye, arm or leg.

A weak link in the total effort is getting the employee to the ear physician. An effective program needs medical follow-up. With the doctor in the picture, the result is usually greater interest, better attitudes, and more hearing protection equipment worn.

Fitting. Too much emphasis cannot be placed on correct fitting of ear plugs. When fitted professionally by a nurse or technician, the program has more prestige.

Each ear should be fitted separately with a plug that fits snugly with no more than slight discomfort, which should be only temporary. If plugs are too uncomfortable, they are not doing the job properly. Individual ear canals differ in size, and a person might need a different sized plug for each ear.

A loose plug can be worse than none. While the fitting is being done, the technician (doctor, nurse or trained layman) should explain the fitting procedure, pointing out that plugs must be fitted personally to each wearer.

At least three or four makes of ear plugs should be available. A type that is suitable for one man may be unsuitable for another. Men are advised to try different devices on the job and report back to the safety or medical department. A choice seems to make any proposition more attractive.

Injurious effects from sweating are not likely, providing there is no existing pathology in the external or middle ear. There is no danger to the drum from wearing soft plugs. None of those generally used are long enough to reach the drum head, if properly fitted.

Circle Item No. 55—Reader Service Card

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Extensive research has proven that continued high noise levels can reduce efficiency and cause permanent hearing loss to employees. Prevent hearing loss, increase efficiency by policing your work areas regularly with the portable H.H. Scott Sound Level Meter.

● Compact—weighs only 2 pounds ● Easy to operate for non-technical personnel ● Flashlight-sized; battery powered ● Meets requirements of American Standards Association ● Rugged Construction for years of service ● Winner of Electrical Manufacturing Award for "Outstanding Achievement in Product Design."

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Free sample when requested on company stationery.

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SMR

Promotion. The program can be aided by posters, picture stories in employee publications and demonstrations at safety meetings.

A good example helps. Many safety men wear goggles and safety shoes on the job. It gives them added authority when they urge employees to protect their eyes and feet. Safety men might also experiment with various types of ear protection and wear them in locations where it is expected of employees. Suggestions based on personal experience are always more convincing. * * *

Modern Aids to Better Hearing

NEARLY 17 million persons in the United States suffer from some degree of impaired hearing. Such disability involves problems in communication, emotional adjustments, and sometimes increased susceptibility to accident.

Many who are totally deaf may never be able to hear sounds. But for many millions improvement in hearing is possible through medical and surgical treatment and hearing aids.

The cumbersome inefficient ear trumpets of the last century have been replaced by inconspicuous, compact devices of remarkable effectiveness. The transistor, introduced in 1952, has made possible efficient hearing equipment so small that it can be built into spectacle temples or worn directly in the ear.

Medical examination. Before trying any hearing aid, the patient should have an otologist (ear specialist) evaluate his hearing. This will show whether medical or surgical treatment or a hearing aid will correct hearing.

Hearing centers in many areas help persons in need of hearing aids. These may be maintained by hospitals, colleges and societies for the hard of hearing. Services are usually non-medical. They include an audiometric test to determine hearing loss, selection of a hearing aid, and training in its use. Some also offer lip reading, speech correction and guidance in personal and employment problems.

Most clinics do not sell hearing aids but have several types from which a selection can be made. This is important, since no one brand is likely to be satisfactory for all types of hearing loss.

Types of receivers. Hearing-aid receivers are of two types: air conduction and bone conduction. The air conduction type is preferred by most users. However, a bone-conduction receiver does not require a molded earpiece and may be preferable if the ear canal cannot tolerate an insert. Some persons cannot tolerate an air-conduction instrument because of annoying sounds that could be avoided with a bone-conduction receiver.

When loss is severe, really good hearing is seldom obtained with a bone-conduction receiver.

The choice will depend on the extent and nature of the hearing loss and the result of trials of various devices.

Not all persons with defective hearing can be helped by a hearing aid alone. If hearing loss is severe, sound gets through to the inner ear but the mechanism that analyzes and passes it on to the brain does not function. Distorted sound patterns reach the brain, making understanding difficult, sometimes impossible.

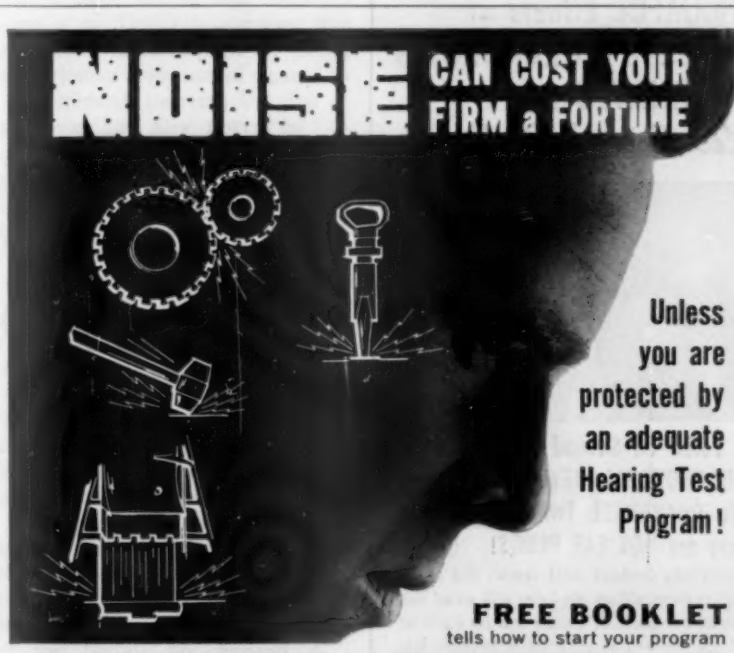
Selecting the aid may take time and expert guidance, although some persons may get satisfaction immediately from one of the good aids now available. Choice may be governed by these factors:

Can the skin of the ear tolerate an aid? For the part that goes in the ear a custom insert is easier on the skin than a stock mold.

If hearing in both ears is impaired, should an aid be used for both? If not, in which ear should it be worn?

A reputable firm, experienced in fitting aids, can give helpful advice but final answers may depend on the experience of the user. Some may have to try several types before finding a satisfactory aid.

Cost and convenience. Standard models vary in price from $50 to $250. In general, the more expensive models have greater power of amplification and more natural tone. Price alone, however, is not necessarily a guarantee of quality. Cost of keep-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Circle Item No. 58—Reader Service Card

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NEW Straightaway® EAR PROTECTORS

Model 372-9A

COMFORT Here are the Ear Protectors sought by every employee working in a hazardous noise area. A low, 4 lb. headband spring pressure makes them comfortable to wear over long periods of time.

SAFETY Straightaway new model 372-9A gives excellent attenuation in noise level areas of up to 130 db. Completely protects hearing, boosts working efficiency.

BUY DIRECT Model 372-9A $12.00 ea. (1-99). $11.00 ea. (100 or more). Write for free trial offer — attenuation chart and information on communication models included.

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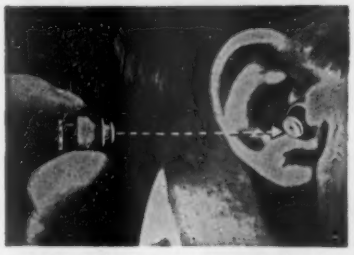
HARMFUL Effects of NOISE To The EARDRUMS ELIMINATED by Lee Sonic EAR-VALVS



A FREE 30 Second Demonstration will PROVE this BEYOND QUESTION We GUARANTEE THAT! Remember they are NOT EAR PLUGS! They are scientifically developed sound controls that protect the ear drums without interfering with normal conversation or sound. We'll gladly send you a pair for 30 day trial with no obligation to purchase. Then you will find out why they are recommended and used wherever NOISE is a HAZARD and a deterrent to normal production. Send for a demonstration pair today on your company letterhead.

SIGMA ENGINEERING COMPANY
1491 Vine St., Dept. F3, Los Angeles 28, Calif.

ing the aid supplied with batteries is also a consideration.

Service. A representative of the manufacturer in the community or in a nearby city is desirable. Batteries are available in most communities.

If the dealer doesn't give an audiometric test, the otologist's report should be presented. If a test is given by the dealer, it should be compared with the otologist's.

When trying instruments, these factors should be considered:

1. Improved hearing for *speech* is the important objective.
2. Speech must not be made uncomfortably loud.
3. The wearer should hear comfortably, without tickling or pain.
4. The instrument should have a reserve of power. If speech is barely audible at maximum volume, the instrument is inadequate.

Ear inserts. The insert should fit properly. One that is too loose will cause a distracting squeal. One that is too tight will be uncomfortable. An insert molded to fit the ear is usually included in the price of the instrument.

Binaural hearing. A person who has normal hearing in one ear and extensive loss in the other usually can understand speech in a quiet room. In compensation cases, loss of hearing in one ear is usually rated as only 10 per cent disabling.

The person with one good ear, however, may have difficulty in determining the source and distance of sound. There is also reduced ability to understand speech when there is other noise in the room, or when many persons are talking.

Hearing glasses, with circuits contained in the temples, provide a convenient method of providing binaural hearing. Each temple contains transistors, a mercury cell battery (smaller in diameter than a dime), printed circuit, microphone, and other parts. Each side has separate volume controls.

Eyeglass aids are not as powerful as other types but, when properly fitted, are satisfactory for those whose hearing loss is not severe.

A hearing aid should not be judged solely on its performance in a sound-conditioned salesroom. It should also be tested where there is background noise.

Most hearing-aid dealers are ethical and reliable. Some, however, have no scruples about taking advantage of an inexperienced buyer. Some dealers offer fairly good instruments at unreasonable prices. Others advertise miracle devices that promise perfect hearing without batteries, tubes, cords or ear buttons—all for less than $20.

Learning to use a hearing aid, like getting used to bifocals, is relatively easy for some persons; for others, it requires patience and persistence. The wearer must learn to accept and interpret both pleasant and unpleasant sounds, just as persons with normal hearing must do.

Helpful information on hearing conservation has been compiled by the American Academy of Ophthalmology and Otolaryngology, 1136 W. Sixth St., Los Angeles.

Valuable advice for the hard of hearing will be found in *Hearing, A Handbook for Laymen,* by Dr. Norton Canfield. Doubleday & Co., 1959.

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SECTION 5

PERSONAL PROTECTION Part 1

IN SECTION 5:

Eye Conservation 89

Respiratory Protection 92

Heads Protected 98

What to Look for When You Buy 120

Offices Have Hazards, Too 122

Work Furniture That Saves Energy 124

REMOVAL OF HAZARDS at their source is the ultimate goal of safety work but it has not yet been found practicable in many operations. Sometimes exposures are too brief or infrequent to justify expensive changes in processes or equipment. And there are emergencies and breakdowns involving hazardous rescue or repair work.

Here personal protective equipment provides a second line of defense against injury, permitting many activities that would be impossible without it.

Goggles, face shields, and hard hats have saved many a worker from serious, even fatal, injuries. Less spectacular, but no less important, is the record of respiratory equipment in protecting men against air contaminants.

Because of its size and scope, this section has been divided into two parts. Part I deals with protection for the eyes, head, and respiratory organs.

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The favorite for prescriptions. Attractive frames of strong nickel silver with overlay of rich mahogany or black plastic.

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The strength of nickel silver with modern styling. Features quick, safe lens changing.

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Plastic frames of crystal with jet black or rich brown overlays and matching temples.

TODAY'S Most Modern SAFETY SPECTACLES

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5 Frame Styles • 5 Temple Styles
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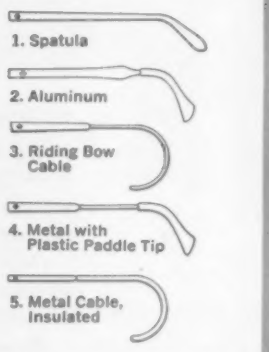
Complete range of eye sizes and bridge widths

Available with Plano or Prescription Safety Lenses, of hardened glass or OPTILITE®. You will like USSSCO's complete Rx service.

5 TEMPLE STYLES



3 SIDESHIELD STYLES

USSSCO
Symbol of highest quality and assurance that product meets all ASA Code and Federal Specifications.

Your Modern Safety Headquarters

All equipment in the USSSCO line is designed, manufactured, and sold direct to the user by United States Safety Service Company. There's a trained, full-time USSSCO Safety Service Engineer near you. See Yellow Pages, or write Kansas City.

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Welding helmets, transparent face shields, and many types of goggles protect eyes against impact and harmful radiation.

Eye Conservation

Programs and equipment for protection and correction

PROTECTION of eyes against physical or chemical agents or radiant energies is an essential part of an industrial safety program.

The cost of eye protection is small in comparison to the potential savings. A pair of impact-resistant spectacles may cost from $2 to $10, while compensation costs for a lost eye may range from $1,600 to $10,000.

Most companies require goggles or face shields on jobs where there is an obvious eye hazard, as in chipping and grinding. A few have established 100 per cent eye protection—for visitors as well as for all employees. They point to the fact that many eye injuries occur on "non-hazardous" jobs.

Benefits of plant eye protection programs carry over to off-the-job activities. Many workers wear goggles on home projects. This is often encouraged by selling equipment at cost or lending it for personal use. The item is charged to the employee and credited on return.

MENACES TO EYES

- Relatively large flying particles
- Dust and small flying particles
- Dust and wind
- Splashing metal
- Gases, fumes and liquids
- Reflected light or glare
- Injurious radiant energy, requiring moderate reduction in intensity
- Injurious radiant energy, requiring great reduction in intensity

Evaluating Eyesight

Eye tests are a standard part of pre-placement examinations and re-examinations. They aid safe placement and enable the employee to have defects corrected.

Screening devices. Mass examination of employees can be made quickly with these devices. They detect substandard vision and appraise visual skills for various jobs. They do not diagnose specific defects.

Three models now available have been in use for years and have proved satisfactory. Scoring cards are provided with the instruments, and the manufacturers give instruction in testing and evaluating results.

Tests take about five minutes and can be given by trained laymen. Employees needing correction are referred to ophthalmologists or optometrists.

Types of Protection

For protecting eyes and face against various occupational hazards, four general types of equipment are used:

1. Goggles (safety glasses, spectacles)
2. Face shields
3. Welding masks and helmets
4. Acid hoods

For detailed information on various items of equipment, consult *American Standard Safety Code for Head, Eye and Respiratory Protection, Z2.1-1959.* This authoritative work, long out of print, has been revised and enlarged.

Corrective Lenses

For visual defects, the wearer may have his prescription ground in impact-resistant or ray-filtering optical material (glass or plastic) or wear cover goggles over spectacles.

For optical reasons as well as convenience, corrective lenses are generally preferred. Safety glasses, of course, must be somewhat heavier than ordinary spectacles.

In prescribing corrective lenses, the refractionist should be familiar

Visual surveys determine the individual's fitness for various jobs and indicate any need for correction of visual defects. Several sight screening instruments are available. (Caterpillar Tractor Co.)

Both plano and corrective goggles should be carefully fitted to the wearer.

with the wearer's job. It is particularly important to know the distance of the work surface from the eye.

Bi-focals may be required for some individuals and some will find tri-focals helpful.

Cover goggles are often preferred where the correction is complicated and expensive lenses would be exposed to pitting. They also have advantages where a nearsighted person requires deep minus lenses. These might be excessively thick at the edges yet too thin for adequate protection at the center.

Cover goggles are available in the cup type with heat-treated glass lenses and the wide-vision type with plastic lenses.

Types of Goggles

Safety glasses are available in many types for practically every occupation. The protective medium may be heat-treated glass, transparent plastic, wire screen, or tinted glass.

Heat-treated glass lenses in spectacle frames, or cup goggles offer basic protection. The nature of the job and its eye hazards determine the specifications.

Spectacle goggles are worn for light or moderately heavy work, such as grinding, machine work, and assembling where working positions are not too close.

The frame must be rigid enough to hold the lenses in position in front of the eyes. The nose bridge should be adjustable, or goggles should be available in enough sizes to fit various faces.

Metal frames are more durable and easier to maintain, but the lighter and better looking plastic frames are preferred by many workers, particularly women.

Side shields of metal or plastic provide protection against light objects flying from the side. They should be used where operations are close together, or where employees work together.

EYE PROTECTION FOR VARIOUS JOBS

TYPES OF EXPOSURE (American Standard Safety Code Z2.1-1959)	TYPES OF PROTECTION									
	CUP GOGGLES	SPECTACLES	—WITH SIDE SHIELDS	PLASTIC EYE SHIELD	PLASTIC FACE SHIELD	WIRE SCREEN SHIELD	FILTER LENSES	RUBBER OR VINYL GOGGLES	HOODS	WELDING HELMETS
Heavy impact, large particles—Chipping, calking, some riveting operations, sledging in quarries.	•		•							
Moderate impact, dust and small flying particles—Scaling and grinding metals, stone dressing where quartz is not involved, some woodworking operations.		•	•	•	•					
Metal sparks and spatter—Electric spot and butt welding; no exposure to excessive energy or glare.			•	•	•					
Splashing metal—Babbitting, pouring lead joints for pipes, casting hot metal, dipping in hot metal baths.	•			•	•	•				
Splashing liquids—Acids and caustics, dipping in galvanized tanks, some japanning operations.	•				•			•	•	
Reflected light and glare—Long exposure to light reflected from snow, water, roads, etc.; incidental glare from furnaces, working near acetylene welding.	•	•	•				•			
Injurious radiant energy—Moderate reduction in visible radiant energy—Oxyacetylene welding and cutting.	•						•			
Injurious radiant energy—Large reduction of visible radiant energy—Arc welding.										•

Convenient cleaning stations encourage clean goggles and spectacles. This one dispenses cleaning fluid and tissues. (Olin Industries, Inc.)

Cup goggles are used for heavy grinding, machining, chipping, riveting, work with molten metals and similar operations.

The cup should be wide enough to protect the eye socket and distribute the impact from any blow over a wide area. The cup should be flameproof, corrosion-resisting, and non-irritating to the skin.

Mask-type goggles, with frames of soft vinyl or rubber, offer protection against splashes of corrosive chemicals and exposure to fine dust. This type is obtainable with lenses of heat-treated or untreated glass or acid-resistant plastic. Some types may be worn over spectacles. Ventilated types are less troubled by fogging.

Dust goggles, leather mask type, for non-corrosive dusts, are made with heat-treated, untreated or filter lenses. Wire screen ventilators around the eye cup provide air circulation.

Miners' goggles of corrosion-resisting wire screen are used for work underground and in other locations where fogging is a serious problem. A dull black coating on the screen reduces reflection.

Plastic lenses are now equal to optical glass in light transmission and freedom from distortion and are now recognized by *ASA Code Z2.1-1959*. Corrections may be ground in them. They are light in weight and resist fogging. They are useful for spotwelding, as molten metal does not adhere to plastic as readily as to glass.

Plastic withstands considerable impact but is marred or scratched more easily than glass.

Plastic lenses should be cleaned with liquid cleaners and soft tissues rather than silicone-treated tissues.

Specifications. Ease of cleaning and sterilization is essential. Most types on the market meet these requirements.

Goggles should be fitted as close to the eyes as possible without touching the eyelashes to give the widest possible angle of vision.

Minimum permissible size for oval lenses is 44.5 mm. in the vertical dimension and 48 mm. in the horizontal. Round lenses should be 50 mm. in diameter.

Lenses should have no appreciable distortion or prism effect.

Strength of heat-treated lenses (resistance to impact) should conform to specifications of the *Federal Standard Stock Catalog*, the government's official purchasing guide, Specification GGG-G-G-501B.

Sweatbands, worn across the forehead in hot, humid locations, help prevent fogging lenses.

Non-fogging compounds, applied to the lenses, help to keep the glass clear.

Face Shields

Transparent plastic shields give eye and face protection on such jobs as metal-sawing, working with chemicals, buffing, sanding, light grinding, or bottle manufacturing.

They should not be used for welding, heavy grinding, or where resistance to severe impact is necessary. Shields may be worn over spectacles.

The plastic sheet should be nonflammable and free from scratches or other flaws which would cause distortion. It should be heavy enough to resist distortion from light impact or heat and humidity.

Wire mesh shields are used for pouring low-melting-point metals, as in babbitting. The mesh stops splashes of metal and allows better ventilation than a solid shield. It will not fog under high temperatures and humidity.

Hoods and Helmets

Hoods and **helmets** of various types are worn to protect the face and head against hazards which do not involve heavy impact.

Regular cleaning and sterilizing of all eye protective equipment is essential to an effective program.

Some types of helmets include a hard hat.

These are equipped with windows but impact-resistant goggles may be worn underneath. If toxic fumes, dusts, or gases are encountered, an air line should be supplied. As these hoods are rather warm, an air line is also desirable for comfort.

—To page 96

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Respiratory Protection

When work must be done in unbreathable air

AIR CONTAMINANTS, the undesirable by-products of many industrial processes, provide some of the most serious problems of occupational and public health. These contaminants range from relatively harmless "nuisance" substances to toxic dusts, vapors, mists, and gases.

Removal of contaminants at the source and enclosure of processes to reduce concentrations in the workroom air should be the aim of the safety and hygiene program but leaks and breakdowns of equipment may occur. There are also operations where exposure is brief or infrequent. For such situations personal protection is needed.

The worker's air intake may be safeguarded by three principal methods:

1. Mechanical filtration to remove dusts, fumes and mists.
2. Absorption or chemical reaction to remove gases and vapors.
3. Supplying respirable air or oxygen.

Types. Five general types of respiratory equipment are:

1. Canister gas masks.
2. Chemical cartridge respirators.
3. Mechanical filter respirators.
4. Supplied-air equipment (hose masks and air-line respirators).
5. Self-contained apparatus supplying oxygen or air.

Each type of equipment has a definite field of usefulness, as well as limitations. Manufacturers and dealers therefore want to know the type of exposure when equipment is ordered.

Approval. Equipment which meets accepted standards carries the label of the Bureau of Mines. Approval specifies type and limits of exposure.

Gas Masks

A gas mask consists of a face piece connected by a flexible tube to a canister that is supported by a canister harness. Inhaled air is drawn through the canister which cleans it chemically. No one chemical yet discovered will remove all contaminants, so the canister must be chosen for the exposure.

The greatest range of protection is provided by the universal mask for use against combination of acid gases, organic vapors, ammonia, carbon monoxide, and smokes. However, as the number of gases increases, the service time of the canister decreases.

Canister gas masks with full facepiece are for emergency protection in atmospheres that are not deficient in oxygen, but which are immediately dangerous to life. Their effectiveness is limited to concentrations of two per cent by volume, except for ammonia, for which the limit is three per cent.

Characteristics. Types of gas masks, their identifying colors and uses are:

White—Acid gases, such as hydrogen sulfide, sulfur dioxide, chlorine, hydrocyanic acid.

Black—Organic vapors, such as aniline, benzene, ether, gasoline, carbon tetrachloride, chloropicrin.

Green—Ammonia gas.

Blue—Carbon monoxide.

Yellow—Combination acid gas and organic vapor.

Yugoslav visitors study American safety methods. Here Aldo P. Osti, safety director for Charles Pfizer & Co., explains respiratory protection.

Brown—Combination acid gas, organic vapor and ammonia gas.

Red—Universal—all industrial gases, including carbon monoxide, smoke, and fumes.

White with green stripe—Hydrogen cyanide.

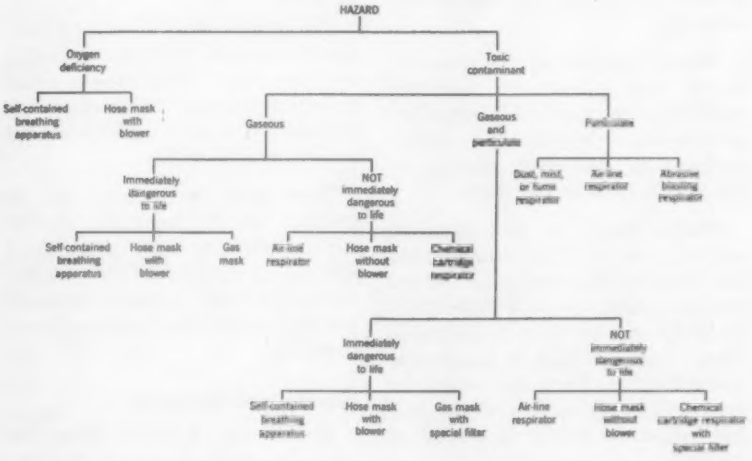
White with yellow stripe—Chlorine.

Cartridge Respirators

Chemical cartridge respirators usually have a half-mask face connected directly to a small container. Chemicals are similar to those used in gas masks.

Cartridge respirators are approved only for non-emergency situations—for atmospheres which are harmful only after prolonged or repeated exposures.

For hot jobs. A heat-exchanger cartridge permits work in excessive-



Outline for selecting respiratory protective devices. (From Bureau of Mines Information Circular 7792)

This article was reviewed by S. J. Pearce, Chief Health and Safety Activity, Bureau of Mines, Department of the Interior.

ly hot atmospheres. When the worker breathes in, heat is stored in the cartridge; when he exhales, heat is removed. Inhaled air is then reduced to a tolerable temperature. This respirator is worn with a specially designed hood.

Filter Respirators

Protection against any form of particulate matter can be provided by a mechanical filter respirator. Major items to be considered are resistance to breathing offered by the filter element, adaptation of facepiece to faces of various shapes, and fineness of particles to be filtered out.

Bureau of Mines Schedule 21 A requires that the complete respirator show a resistance not in excess of 50 mm of water at an inhalation rate of 85 liters of air per minute. Resistance to exhalation under the same conditions may not exceed 25 mm. Commercial respirators are usually held to considerably lower resistances.

Mechanical filter respirators are not effective against solvent vapors, injurious gases, or oxygen deficiency.

Types of mechanical filters approved by the Bureau of Mines are:

1. **Pneumoconiosis - producing and nuisance dust respirators,** for such dusts as aluminum, cellulose, cement, coal, charcoal, coke, flour, gypsum, iron ore, limestone, and wood.
2. **Toxic dust respirators,** for protection against toxic dusts that are not significantly more toxic than lead, such as arsenic, cadmium, chromium, lead, manganese, selenium, vanadium, and their compounds.
3. **Mist respirators,** for protection against pneumoconiosis-producing, chromic acid, and nuisance mists.
4. **Fume respirators,** for protection against fumes (solid dispersoids or particulate matter) that are not significantly more toxic than lead, formed by condensation of vapors, as from heated metals or other substances.
5. **Various combinations** of the above types.

POTENTIAL ASPHYXIA HAZARDS

(Globe Industries, Inc.)

Class	Type	Preventive Measures
1. Diseases	a. Cardiac conditions b. Asthmatic, circulatory cases c. Hypertension sufferers	Regular physical checkups Constant surveillance and encouragement to observe doctor's advice Employee instruction and job selection
2. Equipment	a. Chemical, oil tanks b. Vats and containers c. Poorly ventilated rooms	Hoods over tanks, etc. Exhaust systems Make-up air systems Oxygen masks (self-contained breathing apparatus) for special areas and jobs Employee training
3. Electricity	a. Power and transmission lines b. Powered equipment c. Transformers d. Portable power tools e. Lightning	Signs, identifying color, guard rails and fences Maintenance and inspection of tools Proper grounding of tools Isolation of areas Employee training
4. Asphyxiating gases	a. Carbon monoxide b. Exothermic and endothermic atmospheres c. Carbon dioxide d. Volatile hydrocarbons	Signs, identifying color, guard rail and fences Hoods and exhaust equipment Continuous atmosphere sampling and checking Regular maintenance of all equipment, pipes, fittings and tanks Oxygen masks (self-contained breathing apparatus) for special jobs and areas not rendered safe by other methods Employee training
5. Chemical irritants	a. Chlorine b. Ammonia c. Hydrochloric acid d. Hydrogen sulphide e. Lime f. Sulphur g. Hydrofluoric acid gas h. Nitrous fumes i. Chloride of lime j. Bromine k. Beryllium l. Nitric acid m. Phenols n. Phosgene o. Benzol p. Anticholinesterase agents q. Naphthol r. Sulphuric acid s. Hydrocyanic acid	

Supplied Air

Hose masks. Atmospheres immediately hazardous to life require air supply from a point beyond the contaminated area. With a hose mask, air is normally supplied by a blower. The wearer can inhale through the hose when the blower is not operating.

Hose lines with at least a 1-in. connection are used rather than *air lines* connected to a compressed air system. In a case of failure of air supply, it is possible to breathe through a considerable length of hose.

Hose masks are not approved with more than 150 ft. of hose or where inhalation resistance exceeds 2.5 in. of water, or the exhalation resistance exceeds 1 in. of water, both measured at an air flow rate of 85 liters per minute.

Attachments of additional hose should not exceed the total prescribed length. It should be approved for use with that type of mask. The blower should be located so that only fresh, clean air is supplied to face masks.

The hose mask should always be used for work which involves entering tanks or pits where there is a dangerous or unknown concentra-

—To page 102

Plastic Foam – an entirely new approach to dust filtering

NEW

Resp-R-Aid®

U. S. Patents Applied for

A lightweight, low-cost, urethane filter-respirator with the maximum possible filtering area.

A NEW IDEA IN FILTERING — Resp-R-Aid utilizes the entire mask area for filtering. It is the most effective, most practical dust mask yet conceived. Its increased filtering area — more than double the functional filtering area of most other masks — greatly reduces the inhalation and exhalation resistance to make breathing considerably easier. At the same time, the special urethane construction filters out even minute particles. And every Resp-R-Aid is factory-sanitized with bacteria-static agents.

A NEW USE OF A NEW MATERIAL — Special techniques developed by Watchemoket Optical Company make it possible to mold this amazing new urethane foam into a one-piece, reusable, easy to clean filter. The filter is non-allergenic . . . won't absorb moisture or odors . . . won't mildew or deteriorate . . . can be washed repeatedly with warm water and mild soap . . . it's tough, durable and stable. The entire mask weighs hardly more than an ounce. *Another Watchemoket first.*

The Fastest Custom-Fit Frame in the World

THE

Rapido

LINE

Fits everybody comfortably . . . accommodates glass or plastic lenses . . substantially reduces inventory.

ANOTHER GREAT DEVELOPMENT IN SAFETY FRAMES — The Rapido Line enables you to slash your inventory costs, eliminate fitting problems and provide your workers with attractive, modern, custom-fit frames. You stock only two sizes — 46MM and 48MM — to satisfy all your fitting needs. For the first time, safety and economy have been incorporated successfully into a single safety frame that your workers will wear.

ALL THESE FEATURES — Patented Smooth Hook or Spatula Retrax Temples telescope in and out for a perfect fit . . . two Universal Nosebridges fit comfortably on any shape nose . . . Spred-End Frame accommodates glass, plastic or prescription safety lenses and enables worker to change lenses quickly and easily without heating . . . frames are available with or without lenses, with or without side shields, and in a variety of attractive colors. *Another Watchemoket first.*

TUC-AWAY safety spectacles provide the extra protection of plastic lenses with integral side shields. Adjustable Retrax Temples telescope in or out for perfect fit . . . Universal Nosebridge fits all workers. Lenses snap in or out for quick, easy replacement . . . are securely locked in place against impact. Tuc-Aways are so light and comfortable workers hardly know they are wearing them.

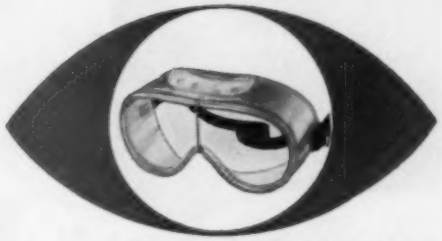
Tuc Away

VISOR-TUCS have all the features of Tuc-Away, plus over-eyes protection. Visor is an integral part of the frame; fits snugly against the forehead. Lenses, interchangeable between Tuc-Away and Visor-Tuc, are available in four styles: Semi-cup, Full-cup, Regular Side Shield and Full Side Shield; choice of Clear, Green or Gold.

Visor-Tucs

SOFT VINYL COVER GOGGLES, the finest of their type . . . are safer because they have heavy duty methacrylate Impax® lenses and Stac-Vent ventilation. Large enough to fit over prescription frames. Lenses are easily replaced and frames last indefinitely. Impax® lenses exceed specification for heavy impact; are securely locked in place by patented metal lock bar. Also available with acetate lenses for light impact.

Soft Vinyl

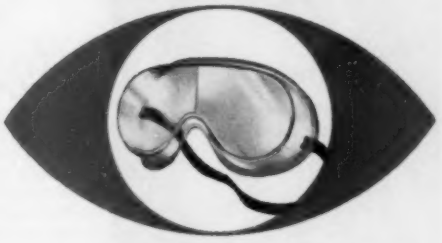


RIGID FRAME COVER GOGGLES molded round or square are available in two sizes, regular and extra large. Heavy impact Impax® lenses are easily replaced and are held securely in place by a positive metal lock bar. Clear plastic frame allows unimpeded vision in all directions. These goggles are large enough to fit over most prescription frames.

Rigid Frame

CHEEPEE, one piece Acetate Goggles, are formed by a special process developed by Watchemoket Optical Co. They are optically correct and provide full, all-around vision with no distortion of image through the lens area. They are fully ventilated, attractive, comfortable and inexpensive . . . an ideal light to medium impact goggle.

Cheepee



METHASPEC Eye Shield is an attractive, low cost, acrylic visitor's goggle, for areas where impact protection is needed. With patented Retrax Temples which telescope in or out for instant comfort, one size will fit almost anyone and keep inventory at a minimum. The curved acrylic lens with integral visor provides good all around protection.

Methaspec

Quality Eye Protective Equipment — *Made by the Leaders in Plastic*

See your local Eye-Savers Dealer or write . . .

WATCHEMOKET OPTICAL CO., INC.

232 West Exchange St., Providence 3, R. I. Throughout Canada • LEVITT-SAFETY LIMITED

...are you getting MAXIMUM SAFETY?

"Supers"

COVER EVERY head HAZARD!

SuperLite® A-1 A-2

Safety-ribbed, heat treated aircraft-type aluminum for maximum rigidity, strength and toughness. Lightest weight! Anodized to reflect heat and to resist corrosion. Smartest appearance. World's most comfortable polyethylene suspension . . . an exclusive feature! Natural color or many others on special order. *Ask for Bulletin 55.*

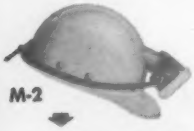
SuperGlas® P-1 P-2

For maximum protection, durability, economy, Rugged, clean, sterilizable, self-extinguishing, Meet Federal Specs. GGG-H-142B. Exceed Federal Specs. for insulation resistance. No dangerous metal parts. Smooth dome avoids impact concentrations. 9 standard "molded thru" colors including phosphorescent, for job coding. *Ask for Bulletin 55.*

SuperElectric® E-1 E-2

Guards against high voltages, impact and penetration in high or low ambient temperatures. Meets all E.E.I. AP-1-1954 specifications. Smooth domes avoid impact concentrations. Exclusive polyethylene suspension gives maximum comfort. Yellow, White, Orange, Gray; other colors on special order. *Ask for Bulletin 55.*

Others tell us (so we don't need to be modest!) that these *"Supers"* with their exclusive suspension are the most comfortable, best looking and most economical that money can buy. All types of FIBRE-METAL safety and welding equipment are described in Catalog No. 26. Bulletin 55 covers hats and caps. **Ask your Welding & Safety Distributor!**



M-2

For Miners, too! SuperGlas with Lamp Bracket

The FIBRE-METAL Products Company | CHESTER PENNA

In CANADA: Fibre-Metal (Canada) Limited, Toronto

See us at The WELDING SHOW—Booth 702—LOS ANGELES

Eye Conservation

—From page 91

Fabric hoods protect the wearer from nuisance dusts and paint spray.

Fire-resistant duck, asbestos, and aluminized asbestos are used for varying degrees of exposure of heat, as in furnace and burning operations and fire fighting.

Rubber, neoprene, plastic film, and fabric impregnated with rubber or plastic provide protection against splashes of acids, caustics, or organic solvents. Not all of these materials are resistant to all exposures and the manufacturer should be consulted.

Hoods and helmets are frequently

EYE PROTECTION DEVICES

As defined by American Standard Safety Code for Head, Eye and Respiratory Protection Z2.1-1959

Protector. A device that provides head, face, eye or respiratory protection against the hazards of processes encountered in employment or in the natural environment.

Goggles. A device with contour-shaped eyecups or facial contact with glass or plastic lenses, worn over the eyes and held in place by a headband for the protection of the eyes and eye sockets.

Face mask. A device worn in front of the eyes and a portion of or all of the face, whose predominant function is protection of the eyes and face.

Helmet. A device worn by a person to shield the eyes, face, neck and other parts of the head.

Hood. A device that completely covers the head, neck and portions of the shoulders.

Spectacles. A device patterned after conventional type spectacle eyewear but of more substantial construction, either with or without sideshields, and with clear, impact-resistant filter or corrective lenses of glass or plastic.

Sideshield. A device of metal, plastic, or other material hinged or fixed firmly to the spectacle lens frame to protect the eye from side exposure.

Shield. A device to be held in the hand, or supported without the aid of the operator, whose predominant function is protection of the eyes and face.

worn as part of a complete outfit giving head-to-foot protection.

Radiant Energy

Glass which filters out harmful ultraviolet and infrared radiation is available in many types of goggles, face shields, and helmets. These filter lenses are worn for welding and cutting, furnace and boiler observation, and other operations where there are high temperatures and excessive glare.

Melters' goggles of cobalt blue glass come in spectacles and cup types in graded shades. This type of glass does not provide protection against ultraviolet or infrared radiations.

Sun glasses are not effective ray-filter glasses for most industrial exposures. They are designed for protection against discomfort caused by sun glare. The better glasses conform to optical standards but many of the cheaper ones show considerable distortion.

Welding helmets provide protection for the eyes and face under the severe conditions of arc welding. They are attached to headgear so they can be raised for placing the work. Impact goggles worn under the helmet provide protection when the helmet is raised.

Helmets are made of dielectric fiber resistant to sparks, molten metal, and flying particles, and having low heat conductivity. Replaceable cover glass protects the filter plate.

Some helmets have a lift-front glass holder which permits rapid inspection of work without removing the helmet.

Hand shields are used on jobs where helmets are not practical, and on tack welding, setting up work, inspection, and time study work. Construction is similar to welding helmets.

Filter Lenses. Following are shades commonly used:

Nos. 1.5 to 3.0—For glare from ice, snow and reflecting surfaces; stray flashes and reflected radiation from cutting and welding in the immediate vicinity. (For goggles or spectacles with side shields worn un-

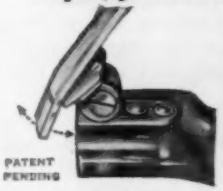
—*To page 118*

imitated imitated imitated imitated imitated imitated

but not duplicated

Only Fendall Safety Glasses offer this combination of features

Adjustable temple joints



PATENT PENDING

Front end of temple is designed so it can be adjusted for perfect temple fitting on all faces. For a narrow face, bend it in; for a wide face, bend it out; permits temple adjustment to provide exact amount of side tension to prevent slipppage.

Multi-fit bridge

PATENTED AND PATENT PENDING

Fendall's patented Multi-Fit Bridge automatically fits 9 out of 10. Self-adapting to wearer's face, no adjusting. You can fit practically every worker with this one bridge size. Reduces inventory. Unequalled fitting ease and wearing comfort.

Lok-tite hinge pins

PATENT PENDING

This exclusive Fendall feature eliminates the trouble and annoyance caused by loose and lost temple screws. Fendall's Lok-Tite Hinge Pins snap in easily, lock in position, cannot fall out, yet they are simple to remove, if necessary.

NEW LENS SHAPE provides closer orbital fit, wider vision, increased safety.

SPECIAL SKULL TEMPLES of nickel silver, with molded plastic paddles. Easily adjusted for perfect fit, no slippage.

COLORED FRAMES—Available in flesh, bronze, cordovan and green.

SPECIAL INSULATION on cable-type temples. Will not loosen. Perspiration-resistant.

SMART MODERN STYLING—Sturdy and comfortable, without the bulky look and feel of "goggles."

Choice of acetate or metal frames, skull temples, cable temples, sideshields, etc.

Send for complete details now!

FENDALL PRODUCTS FEND ALL HAZARDS

FENDALL COMPANY

4509 N. LINCOLN AVENUE, CHICAGO 25, ILLINOIS

Maintenance of protective hats is important in the head protection program. Hats should be cleaned and sterilized regularly and linings replaced.

Heads Protected

Hard hats can take more punishment than skulls

HEAD INJURIES caused by falling objects are a serious hazard in many industries and such injuries are usually serious—often fatal.

The hard hat, first introduced in mines shortly after World War I and much improved since then, has an impressive record of lives saved. Head protection has become standard practice in other industries, including construction, logging, shipbuilding, and many types of maintenance work.

Head protection is also becoming general among public utility companies where linemen wear protective hats for protection against live wires overhead as well as against impact.

Protective hats are also useful where there is danger of bumping the head against overhead structures.

Wearing protective hats is included in many labor contracts and the unions have helped in educating their members on the need for head protection.

Requirements. A protective hat should have:

1. Resistance against impact.
2. Resistance to fire.
3. Resistance to moisture.
4. Light weight.
5. Insulation against electricity if worn around live equipment.

These requirements are outlined in *Federal Specifications GGG-H-142: Construction Workers' Helmets.*

Types. The type in general use has a brim all the way around, protecting the head, face and back of the neck.

The cap type is sometimes preferred for confined spaces where a brim might be in the way.

Some models have brackets to support miners' cap lamps or welding masks.

Construction

Materials most widely used are laminated plastic, glass fiber, and aluminum alloy.

Cloth laminated plastic molded under high pressure resists impact and effects of water and oil. Dielectric strength is good but not equal to the protection in hats designed especially for electrical workers.

Molded plastic, molded under high pressure, is resistant to impact and effects of water and oil. Electrical workers' hats are molded from special plastics and have high dielectric strength in addition to resistance to impact, water and oil.

Glass fiber impregnated with resin has a high-strength-weight ratio; high dielectric strength; and resistance to moisture, caustics, and acids.

Aluminum alloy is light in weight and meets all requirements for resistance to impact and moisture, but it is a good conductor of electricity. Metal hats should not be worn where there is danger of electrical contact.

The hard shell of the hat is supported by a cradle or hammock which keeps the shell away from the hat, cushions it against blows, and permits circulation of air around the head.

Cradle and sweatband should be replaceable because of deterioration through perspiration. This is important for sanitary reasons, since hats may be worn by more than one person. The shell can be sterilized by any of the common methods.

For cold weather a lining of water-resistant cloth may be attached to the hat to protect head, neck and ears.

On locations exposed to strong winds, such as bridges and oil derricks, a chin strap is useful.

An eyeshield of transparent plastic may be attached to some types of hats. It is hinged under the peak and lies flat against the peak when not in use.

Weight. A maximum of 14½ oz. for the complete hat is specified by Federal Specifications.

Colors. Hats are available from most manufacturers in seven standard colors—white, gray, red, green, blue, brown, and black. Other colors are available on special order. Color is permanent because it goes all the way through the material.

Special colors are sometimes ordered, or stock hats painted, to match the color used by the company on vehicles or in advertising.

Hats which glow in the dark are obtainable on special order.

Distinctive colors and designs are also used to designate the wearer's department or trade. This is often done in plants where certain areas are restricted to authorized employees.

—To page 112

Circle Item No. 64—Reader Service Card

There is a Dockson Face Shield for every requirement. Light weight, comfortable, dependable protection at prices far lower than their fine quality would seem to permit.

Each Dockson Face Shield is designed for maximum protection of the wearer on his specific job. Only the best materials are used to assure longest possible service life.

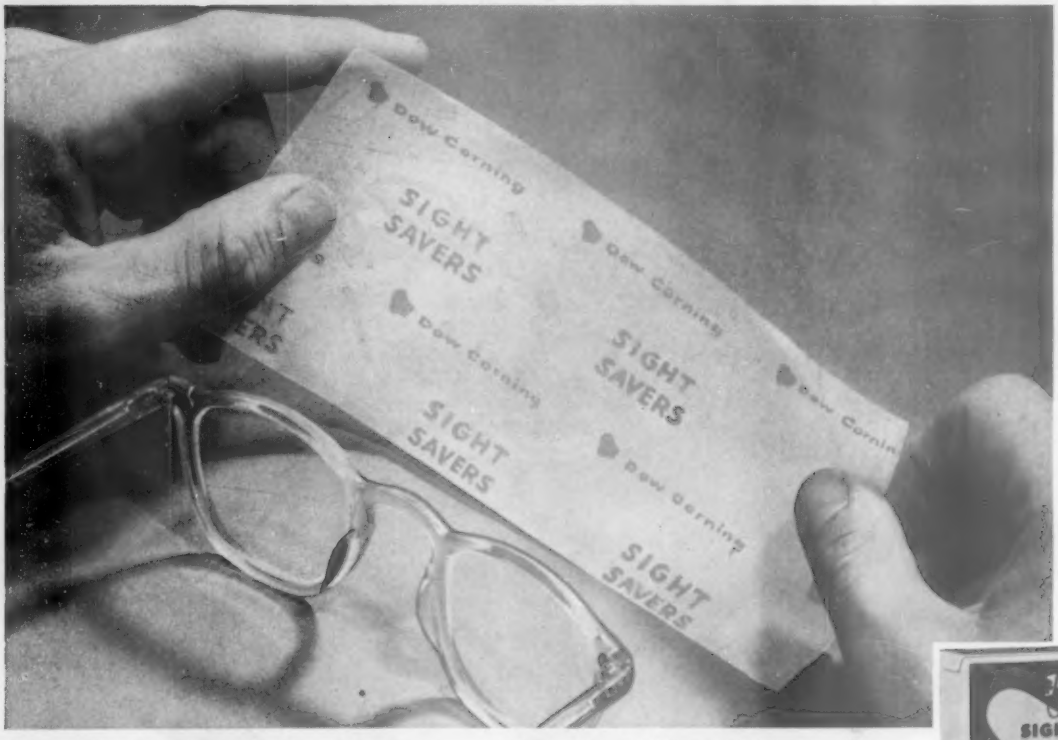
Headgears are light, sturdy and comfortable — easily adjustable for size or one hand tip-up. Windows are spark and heat resistant cellulose acetate, bound in most cases with rustproof metal channel for greater strength.

Write for complete catalog No. S-58 and the name of your local distributor.

Dockson CORPORATION

3839 WABASH AVENUE
DETROIT 8, MICHIGAN

NEW SIGHT SAVERS



Every tissue embossed . . . your guarantee of genuine SIGHT SAVER quality.

FREE WALL DISPENSERS!

***$2.50 value each . . . free with your purchase and continued use of* SIGHT SAVERS**

- **Strong, heavy-gauge steel . . . pilfer proof.**
- **No waste — delivers just one tissue at a time.**
- **No mess — no liquids, no bottles, no extras.**
- **Never runs out — can be refilled before empty.**
- **Easy to install — compact, only 3½" x 8" overall.**
- **Attractive colors — safety green, white or black.**

...by far, the most efficient lens tissues you can supply!

New soft-textured, embossed finish

Gives greatest cleaning and polishing action --- no slip, easier to grip!

Completely soaked in silicones

Use either side of the tissue. Remember, it's the silicones on the tissue that do the work and SIGHT SAVERS have at least twice the silicone content of other tissues . . . it's as simple as that!

More reasons why SIGHT SAVERS are your safest buy

- Nationally advertised; known, preferred and purchased by millions of satisfied users. You don't have to "*sell*" workers on using SIGHT SAVERS . . . your employees are already *pre-sold*.
- Exactly the right size to clean glasses most efficiently . . . economically.
- Endorsed by leading opticians . . . meet Federal specification UU-P-313d for lens cleaning tissues.

*Promote eye safety the most popular, most effective, most economical way . . . the SIGHT SAVER way! Order from your safety supply distributor.**

* In Canada from any branch of The Safety Supply Company.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

Respiratory Protection

—*From page 93*

tion of dust, mist, vapor, or gas, or an oxygen deficiency.

Harness to pull the hose lines should be inspected before use. Component parts of harness must be able to withstand a pull of at least 250 lbs.

Air-line respirators are connected to compressed air lines. They are not intended for atmospheres immediately hazardous to life where the wearer could not escape if failure of the air supply required him to remove the respirator.

This respirator differs from the hose mask mainly in two features: it has a hand-operated, quickly detachable coupling connected to the belt or body harness so that the operator can connect to a compressed air hose, and the rate of air flow to the facepiece or hood is governed by the length of the air-supply hose and the air pressure applied to the inlet. Approved hose lengths and air pressures are listed on the approval label, also a flow-limiting device to permit air flows only between 2 and 20 cfm.

A trap and filter installed in the compressed air line ahead of the masks to separate oil, water, scale, or other extraneous matter from the air stream is desirable.

An air-pressure regulator in the line is required if air is supplied at a pressure in excess of 125 psi., also a pressure release valve which will operate if the regulator fails.

Supplied-air respirators are the best type for continuous use at one location. Other types of respiratory protective devices may give adequate protection, but offer breathing resistance and are consequently more fatiguing.

To obtain clean air, the compressor intake must be kept away from sources of contamination. The compressor should be well maintained. It must not run too hot, as dangerous amounts of carbon monoxide can be produced by overheating.

Air-supplied suits. Sometimes rescue or emergency repair work must be done in atmospheres extremely corrosive to the skin and mucous membranes, in addition to being acutely poisonous. For these conditions, complete suits of impervious material with breathing equipment are available.

If a hose line is used, it should be connected to the suit itself as well as to the helmet. Unless well ventilated, such a suit is fatiguing and dangerous to wear for long periods.

Abrasive blasting requires an adequate supply of filtered air, also mechanical protection for the head and neck—either a flexible hood or a helmet of some rigid material.

A window of transparent material, suitable for optical use, protected from the abrasive by a fine mesh wire screen should be provided. Both windows and protective screen should be readily replaceable.

Self-Contained Apparatus

For work in oxygen-deficient or highly toxic atmospheres at distances more than 150 ft. from the source of fresh air, self-contained oxygen-breathing apparatus should be used.

Two principal types of self-contained apparatus are: (1) recirculating type and (2) demand type. The recircuating type furnishes oxygen to the wearer; The demand type furnishes air or oxygen.

Air-supplied suit for abrasive blasting protects eyes, head, neck, respiratory organs and body.

Care of Equipment

A central station for care and maintenance of respiratory equipment is desirable where many respirators are in use. Such a unit can also handle distribution and maintenance of other personal protective equipment.

Each employee should be provided with two respirators and either a locker or a hook at the central station. Each respirator should be branded or tagged with the employee's number.

Cleaning and disinfecting. All parts, except canisters and cartridges, should be cleaned after use. Facepieces, air lines and hose may be washed with soap and water, rinsed, and dried.

All respiratory devices should be disinfected before being passed from employee to employee. Methods of disinfecting include:

1. Immersion in solution of quaternary ammonium salt detergent. This material is not injurious to skin or to rubber.
2. Subjection to a moist atmosphere of antiseptic gas, such as formaldehyde, for 10 minutes.
3. Immersion for 10 minutes in a solution of formalin made by dissolving 1 part of 40 per cent formaldehyde

If methods 2 or 3 are used, parts

—*To page 105*

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Circle Item No. 66—Reader Service Card

SAFETY IS WORTH WORKING FOR

WILLSON

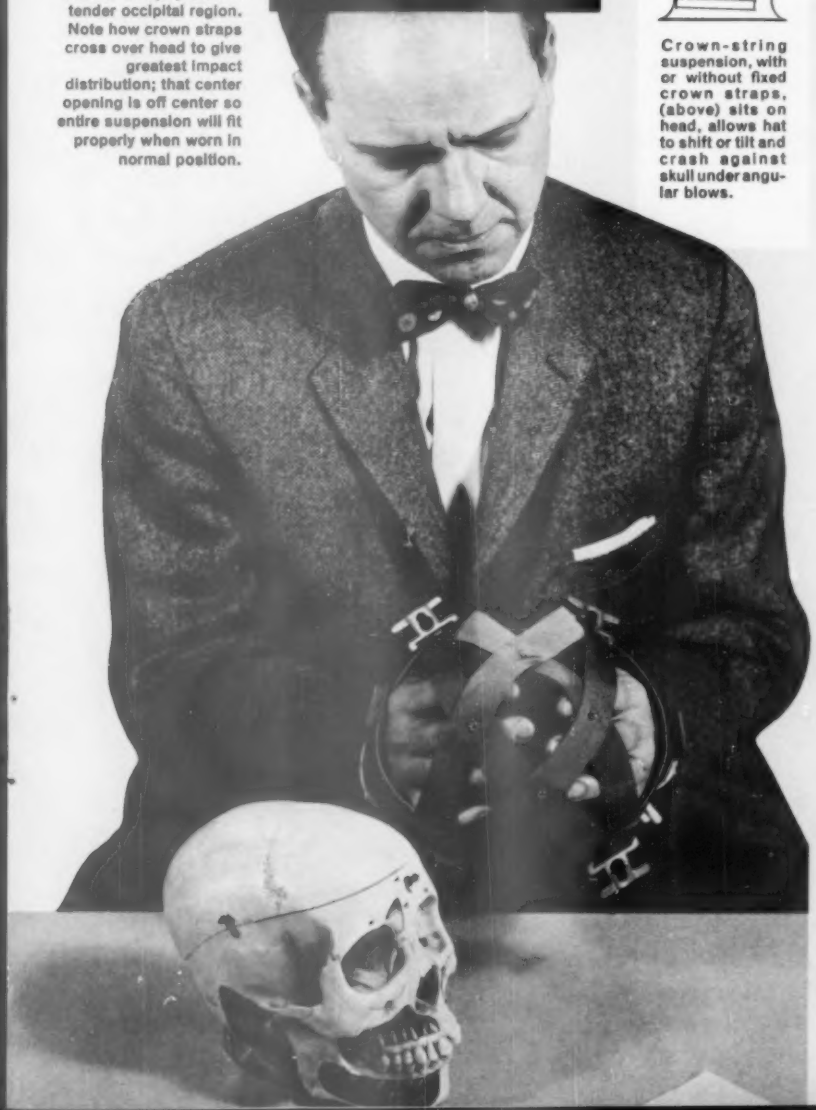
SAFETY CLINIC

A fracture on the skull can occur some distance from the point of initial impact. Blow on mid-occipital region of skull (A) may send shock waves downward toward foramen magnum (B), vital opening for spinal cord. Though force strikes fairly high on skull, fracture often occurs in lower region that is more susceptible to injury from heavy impact.

Geodetic Suspension dissipates and spreads impact shock, reducing chance of injury even in tender occipital region. Note how crown straps cross over head to give greatest impact distribution; that center opening is off center so entire suspension will fit properly when worn in normal position.

Geodetic Strap Suspension conforms to head. Its firm yet comfortable gripping effect strongly resists tendency of hat shell to "bottom" on head. We know this design increases skull protection. We like to think it helps sell a few safety hats, too.

Crown-string suspension, with or without fixed crown straps, (above) sits on head, allows hat to shift or tilt and crash against skull under angular blows.



How Geodetic Suspension minimizes psi shock loads on skull occipital region

Skull fracture studies at the Wayne University and Grace Hospital, Detroit, Michigan, reveal that as little as 400 inch-pounds of energy can produce a single linear fracture on the normal head. In fact, only slight additional force is needed to completely destroy a skull.

We're not sure who talked 55 normal heads into the thrill of undergoing a skull fracture,* but the studies also show that many linear fractures result from the skull's outbending, some distance from the point of impact. Outbending is a simultaneous result of the skull's inbending at the point of the blow.

The head-bouncers tell us that total injurious effect to the head when struck depends on the magnitude of the energy and its rate of absorption by the skull. This helps point up the importance of *Geodetic* Suspension for industrial headwear, developed by the world-famous Cornell Aeronautical Laboratory, Inc.

Geodetic or "great circle" suspension dissipates impact shock loads over a wide head area. Chance of either inbending or outbending is greatly reduced. The wearer can sustain a much heavier blow without injury. This is extremely important for protecting the vital occipital region, easily injured by heavy impacts.

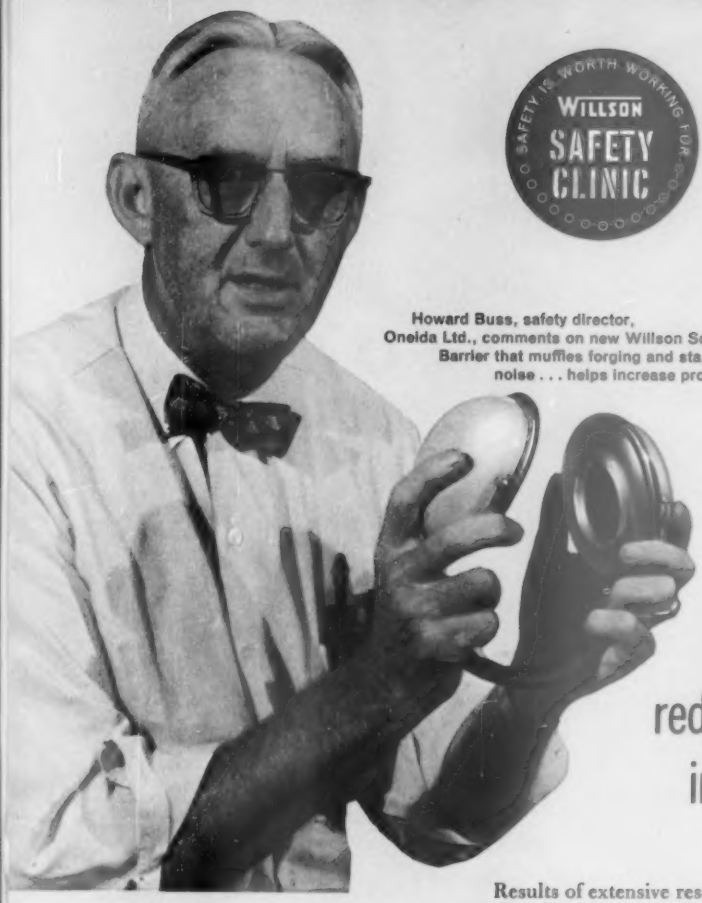
Besides being comfortable, the Geodetic Suspension spreads and balances hat weight and grips the head to prevent slipping and tipping when the shell is struck by an angular impact. The suspension has a size-adjusting leatherette sweatband. Crown straps are permanently fitted to head shape along "geodetic" lines of the head and a clearance of 1¼ in. or more is always maintained between top of head and hat shell. Ask your Willson Distributor to show you how the Geodetic Suspension can increase safety in your plant.

WILLSON®

Willson Super-Tough safety hats and caps, with Geodetic Suspension, are available in phenolic, fiberglas, insulating, and aluminum styles.

*In actual experiments, 55 completely intact human cadaver heads were tested under conditions scientifically controlled to simulate normal blows on the skull.

turn page



Howard Buss, safety director, Oneida Ltd., comments on new Willson Sound Barrier that muffles forging and stamping noise . . . helps increase production.

WILLSON SAFETY CLINIC

SAFETY IS WORTH WORKING FOR

Earmuff-designed Sound Barrier attenuates noise in the drop room . . . protects operators of 600-pound pneumatic air hammers from over-all noise level of 108 decibels.

Noise control program reduces worker fatigue in stamping plant

Results of extensive research in production departments at Oneida Ltd., Sherrill, New York, uncover new and promising opportunities for metalworking plants to increase production and protect shop workers.

Oneida machine operators in buffing, polishing, and stamping departments have been wearing Willson Sound Barriers for more than 18 months. Direct results, according to Mr. Howard Buss, safety director, are increased operating efficiency, reduced worker fatigue, and improved quantity and quality of production.

All phases of sound protection, including shielding, testing, and personal protection, have been investigated in a 7-year program administered by a full-time industrial physician, two project engineers, the director of engineering, and the safety director.

Willson Model 258 Sound Barrier has proved so successful and economical for reducing harmful noise by 15 to 25 decibels that Oneida plans to extend the program to all high-level noise areas. This company believes hearing protection must be part of a safety program, and that production and quality control benefits more than offset the cost.

Common shop noises tested . . .

Analysis of large groups of industrial workers proves that rapid shifts in threshold are experienced at noise levels above 90 decibels after only two years' exposure. And it shows small average recovery of hearing acuity after exposure ends.

At Oneida, the effects of high-decibel noise were tested on a variety of operations. Noise level created by forging hammers, for example, tested at 110 decibels. Stock cutoff operations produced 110 decibels, and a hand-fed paper shredder rated 106 decibels. An automatic buffing machine registered 98 to 103 decibels.

This program was an abrupt change for older employees at Oneida, some of whom never had worn ear plugs. But the close fit of the fluid-filled vinyl cushions, which assures outstanding attenuation, soon convinced the skeptics, particularly since the cups do not interfere with normal levels of conversation, and can be worn right over the temples of safety glasses.

Today, approximately 100 Oneida employees are wearing Sound Barriers on eight-hour shifts. Audiogram tests are given at the time of employment and at six-month intervals. Noise level tests are conducted almost weekly.

Oneida has made an important decision about safety. It has found that the right program for them is not a carbon copy of other programs. It recognizes the importance of a flexible plan, the success of which depends upon teamwork between the engineering, production, and safety departments. This company knows that safety and productivity go hand in hand.

For detailed information on how the Sound Barrier improves protection of the human ear, phone your Willson Safety Equipment Distributor or contact the factory direct.

New facts for management

How to prevent profit loss due to "routine" eye injuries

Here are facts your management wants to know about eye protection.
1 How the real cost of "routine" eye injuries and accidents can average $20,000 a year in a plant employing 1400 workers.
2 Why today's machines and manufacturing methods increase hazards . . . make downtime cost two to three times more than five years ago.
3 How Willson's universal-fit safety glasses reduce the *real cost* of eye protection.
4 How you can evaluate specific opportunities to reduce profit loss and increase safety with Willson's new plant survey program.
Write today for your free copy of "The Routine Eye Injury."

WILLSON
Willson Products Division
Ray-O-Vac Company
Second and Washington Streets
Reading, Pennsylvania
Safety Supply Company of Canada

SAFETY is worth working for

Respiratory Protection

—From page 102

should be rinsed thoroughly after disinfecting to remove traces of disinfectant, then dried.

Elastic head bands may be damaged by disinfecting but they should be washed with soap and water. Bands should be replaced when the respirator is transferred to another employee.

The respirator should be turned in to the central station at the end of each shift to be cleaned and disinfected and repaired, if necessary.

Where the maintenance crew works several shifts, one respirator per employee may be sufficient. Usually, however, it is necessary to have one complete unit in the process of cleaning while the other is being worn.

Filters should be replaced when clogged, and used ones discarded. Canisters should be replaced at regular intervals. Even when not in use they lose their effectiveness with time. * * *

Training in Use of Respiratory Equipment

Respirators are often used as emergency equipment under conditions of strain and excitement. Those who will have to use them should therefore be trained thoroughly.

Regular inspection is also necessary to avoid deterioration of equipment which is not used regularly.

Training

1. Train each person in putting mask on and adjusting it rapidly to his face.

2. Have each person wear it long enough to become accustomed to the breathing resistance and to putting it on and taking it off.

3. Repeat training at regular intervals.

Maintenance of Gas Masks

1. Set up a card for each gas mask to indicate date of latest inspection and replacement of canister and amount of use, if any, which canister has had.

2. Replace canister that is assembled with facepiece at least annually, even if not used.

3. When a canister is replaced, examine facepiece, harness, hose, and headbands for leaks or deterioration. Replace defective parts.

4. Canisters are ordinarily supplied with seals to keep out air while in storage. Remove seals when canister is placed in service. Replace bottom seal after use.

5. Store mask in a place as cool and dry as possible and accessible to hazardous area.

6. If mask is for emergency use only, canister should be replaced after use. * * *

Bright Monday

—From page 3

ing project to see if I could find the basis for overturning last week's decision.

By the time I had blocked in what I wanted and gotten one of my assistants to work on the data supporting my argument, the morning mail was waiting for me. It was, I suppose, a normal Monday morning mail, but I found it rewarding. There was a report on analysis of some air samples that backed up a couple of hunches I had on the subject. Most of the rest of the mail was routine enough, but I found it interesting and profitable reading.

I had hardly finished the mail when there was Max standing in front of my desk, fat and smiling, as always.

I stood up and shook hands with my favorite safety equipment salesman, and ordered coffee sent in. Max proceeded to brief me on the latest gossip of the profession, well mixed with plugs for his new products.

A day with Max is always worthwhile. Some way or other, along with being a fine salesman, Max has picked up the talents of a shrewd evaluator of industrial safety operations. So I always exploit him by taking him over the job and using his eyes and sharp mind to find weak spots I may have missed.

We spent the morning roaming the project, while he told me a collection of stories he'd picked up in the past year. Even in the midst of these yarns, the little eyes in his fat face searched the area, noting points that were worth remembering.

After lunch, I called in my two assistants and let Max lecture them. "You boys," he began, "work for a very stubborn man. It is his strength and weakness. Even when he was young like you, he was stubborn, and he would not always buy what I peddled. I think he maybe makes you stubborn too, no?"

My boys looked at me quizzically. I think they were asking themselves who this fat screwball with the Middle European accent was. I said only, "Listen to Max. You can't always believe him, but you can never afford not to listen to him."

Max then started in. "The housekeeping is pretty good—nearly very good. Not always, not everywhere. There is trouble in the instrument plant, and that foundry south of the water tower. But mostly it is so good I am sure you are still very stubborn about keeping things in order. So-o, that is good. But there is some very bad truck driving on the property, and there are some very badly laid out plants." (Here he enumerated, mentioning two layout problems I had already recognized and three I had not.)

Max kicked off his shoes and wiggled his toes.

"So-o, it is good to not be walking. Always this man, he walks my legs off, and I think maybe he makes you walk your legs off, too, but you are not old, worn-out peddlers.

"But the worst thing I saw all morning was in the first-aid rooms! Rat's nests! Half-used bottles of antiseptic! Unrolled bandages! Obsolete manuals! Worse yet, much worse—first-aid supplies from my competitors, the scoundrels! Do something quick, or you will have all kinds of infections and I will starve to death! So-o." He folded his hands on his stomach and pretended to doze off.

The boys looked at me oddly, and one of them said, "You know, he's about half right."

Max opened one eye, sighed, and pulled out an order book. "Even if I am only half right, it is maybe worth an order," he said.

← Circle Item No. 67—Reader Service Card

Wire from Washington

—*From page 5*

Radiation Council, to protect the public against radiation. The Atomic Energy Commission's annual report for 1959 describes laboratory experiments on animals with radon, a gas found in uranium mines, showing resultant reduction of life span.

The AEC issued a notice of proposed rule-making concerning a proposed amendment to its radiation protection standards designed to deny licenses which would authorize the disposal of radioactive wastes on privately-owned sites by persons engaged in commercial radioactive waste-disposal activities.

The AEC amended its regulations to refer license applications for production, utilization or testing facilities to the Advisory Committee on Reactor Safeguards for review and report.

Traffic Safety. The President issued an executive order formalizing the President's Committee for Traffic Safety, originally established in 1954 "to advance the cause of street and highway safety." He assigned these duties to the committee:

1. To promote state and community application of the action program.

2. To revise and perfect that action program in accordance with the findings of further research and experience.

3. To develop effective citizen organization in support of public officials with action program responsibilities.

4. To cooperate with federal, state and local officials, and interested national organizations to adopt uniform traffic laws and ordinances and conduct balanced traffic safety programs.

5. To aid citizen leaders to plan and guide nationwide traffic safety educational efforts.

On receiving a report from this committee, the President urged "sharply intensified application of proved accident-prevention techniques to curb the nation's traffic deaths."

Supreme Court Justice Tom C. Clark proposed a three-point program to eliminate the reckless driver "before he eliminates us." His proposals emphasized: as safe an automobile as possible, including inspection laws in all the states; compulsory driver-education programs in all high schools; and improvement of the traffic court system.

Air pollution continued to be of great concern. The President advised Congress that the secretary of the Department of Health, Education and Welfare would propose legislation "to authorize greater federal leadership in combatting air pollution." Dr. R. A. Prindle, chief of the Public Health Service's air pollution medical program, warned that "the over-all effect of air pollution on the economy, health, and welfare of the people may become a disaster."

He said "future projections of traffic volumes point to the conclusion that the level of lead in the community air will increase until changes in fuel or traffic are made."

In commenting on press reports that automobile manufacturers intend to install an air pollution-reducing device on all new cars offered for sale in California, beginning with the 1961 model, Senator Richard Neuberger (Ore.) asked: "What about the rest of us?" and suggested that "the auto manufacturers give us all a break."

Congressman Kenneth Roberts said he hoped the device would be installed as standard equipment on all 1961 models.

Commercial Transportation. The ICC amended its regulations: to add new provisions concerning required and prohibited use of turn signals; to amend provisions relating to required and prohibited use of directional signals and the use of emergency signals; and to amend requirements dealing with lighting devices, reflectors, and electric equipment.

Aviation Safety. Airline crashes have caused intense congressional concern. The Aviation Subcommittee of the Senate Committee on Interstate and Foreign Commerce continued its air safety hearings (See "Wire," February 1960).

The federal aviation administrator reported on various intensive researches into an aircraft anti-collision system, but warned against expecting any immediate solution to the problem of in-flight crashes.

The Weather Bureau testified that aviation's needs exceed the Bureau's capacity and that the President proposed increased funds to the Bureau for a drive to reduce the number of air crashes caused by weather.

In a later action the Department of Commerce Appropriation Committee of the House of Representatives cut out a major portion of the request for funds for new aviation weather services to enable consideration of a combined project for the Weather Bureau, the Air Force and the FAA.

Senator Vance Hartke (Ind.) asked the Senate "whether we are developing a national 'ho hum' attitude" toward airline safety. He said: "None of us wants the airways to become the death traps that our highways have become. We do not want the threat of death on the highways to become the threat of death on the airways."

He suggested "perhaps the administration should consider halting all air traffic for a few days for an exhaustive check." Senator Barry Goldwater (Ariz.) objected to the proposed stoppage, stating that air travel had a lower fatality rate than highway vehicular travel.

Senator A. S. Mike Monroney (Okla.), chairman of the Senate Aviation Subcommittee, urged the FAA to "crack down" on communities that failed to provide land for installation of airport approach lights and to close down runways without such safety features.

The federal aviation administrator confessed to "a mania for safety." The FAA announced contracting with a western university for a special course for FAA personnel in the techniques of accident prevention and investigation. A joint CAB-FAA team is now routinely assigned to study the human factors in all aircraft accident investigations.

For jet flights above 24,000 ft, the FAA proposed mandatory requirements intended to increase operational safety and efficiency.

Other proposed regulations strengthen the authority of air traffic controllers to require immediate compliance with specific air traffic instructions, in the interest of safety

—*To page 120*

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THE SAFETY LIBRARY

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By LOIS ZEARING, Librarian, NSC

BOOKS AND PAMPHLETS

Automotive Industry

1960 SAE Handbook. 903 pp. Society of Automotive Engineers, Inc., 485 Lexington Ave., New York 17. Price $20. (Standards, information reports and recommended practices.)

Concrete Industry

Work Injuries and Work-Injury Rates in the Concrete Brick and Block Industry, 1957. 1959. 34 pp. U. S. Department of Labor, Bureau of Labor Statistics, Washington 25, D. C.

Electrical Industry

NEMA Standards Publications: Power Switchgear Assemblies. (Pub. No. S.G. 5-1959) Price $4. *Installation of Vertical Hydraulic-Turbine-Driven Generators*. (Pub. No. L.G. 3-1959) Price $2. *Wiring Devices*. (Pub. No. W.D. 2-1959) Price 20¢.

National Electrical Manufacturers Association, 155 East 44th St., New York 17.

LP-Gas

Pressure Regulators for LP-Gas, Standards for Safety. 1959. 16pp. Underwriters Laboratories, 207 E. Ohio St., Chicago 11. (UL 144)

Ladders

Portable Wood Ladders, Standards for Safety. Fourth Ed. 1959. 31pp. Underwriters Laboratories, 207 E. Ohio St., Chicago 11. (UL 112)

Noise

Ultrasonics. December 1959. Association of Casualty and Surety Companies, 60 John St., New York 38. (Special Hazards Bulletin Z-115-Vol. XII, pp. 43-49.)

Railroads

Accident Bulletin. 1958. Interstate Commerce Commission, Bureau of Transport Economics Statistics. 1959. 112pp. Superintendent of Documents, Washington 25, D. C. Price 55¢. (Bulletin No. 127)

(Summary and analysis of accidents on railroads in the United States subject to the Interstate Commerce Act.)

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Aeronautics

"The Safety Problem." Robert Holtz. (Editorial) *Aviation Week*. Jan. 11, 1960. p. 21.

Air Pollution

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"Air Pollution Hazards from Diesel Locomotive Traffic in Railway Tunnel." Morris Katz and others. *AMA Archives of Industrial Health*. December 1959. pp. 57/493-68/504.

"Progress of the Automobile Industry in Regard to Automobile Exhaust and Air Pollution." James M. Chandler. *American Industrial Hygiene Association Journal*. December 1959. pp. 488-493.

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"Safety Precautions for Automatic Steam Boilers." William McCumber. *Pacific Factory*. December 1959. pp. 28-29.

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"Frontier Monument to Safety: Record Glen Canyon Arch Is Insurance Model in Loss Prevention Safety." *Journal of American Insurance*. January 1960. pp. 8-11.

"'Job Clean-Up' in Railroad Construction." Charles A. Goodwin. *The Constructor*. January 1960. pp. 61-62.

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—*To page 111*

get modern eye protection

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Bullard has a 6-point suspension. Most others have 4. This keeps the shell steadier—and gives an added margin of protection. Or, look at the adjusting clips; Bullard has two, so the shell fits evenly. No ungainly wobble or imbalance. Run your fingers around the wide, smooth sweat band. Both Bullard vinyl and new perspiration-absorbent poly-urethene bands protect against chafing and irritation.

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Safety Library

—*From page 108*

Medicine and Surgery. January 1960. pp. 28-32.

"Periodic Health Examination: Nature and Distribution of Newly Discovered Disease in Executives." Kendall A. Elsom and others. *Journal of the American Medical Association*. Jan. 2, 1960. pp 5-10.

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(National Gypsum Company established a notable safety record with modern methods in its Bellefonte Mine.)

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"Microwave 'Hazards' Are Exaggerated." Charles D. La Ford. *Missiles and Rockets*. Dec. 14, 1959. pp. 20, 23-24.

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"Machining Safety Check List." Robert Currie. *Wood and Wood Products*. December 1959. p. 46.

ADDRESSES OF MAGAZINES

Readers are asked to send their requests for copies of magazine articles to the publishers. The NSC Library is unable to fill such orders.

AMA Archives of Industrial Health, 535 N. Dearborn St., Chicago 10.

American Association of Industrial Nurses Journal, 654 Madison Ave., New York 21.

The American City, 470 Fourth Ave., New York 16.

American Gas Association Monthly, 420 Lexington Ave., New York 17.

American Industrial Hygiene Association Journal, 1014 Broadway, Cincinnati 2, Ohio.

American Machinist, 330 W. 42nd St., New York 36.

Aviation Week, 330 W. 42nd St., New York 36.

The British Journal of Industrial Safety, 52 Grosvenor Gardens, London, S. W. 1.

Coal Age, 330 W. 42nd St., New York 36.

The Constructor, A. G. C. Building, 1957 E St., N. W., Washington 6, D. C.

Electric Light and Power, 6 N. Michigan Ave., Chicago 2.

Electrical Engineering, 33 W. 39th St., New York 18.

Engineering and Mining Journal, 330 W. 42nd St., New York 36.

Engineering News-Record, 330 W. 42nd St., New York 36.

The Explosives Engineer, 613 Delaware Trust Building, Wilmington, Del.

Industrial and Engineering Chemistry, American Chemical Society, 1155 16th St., N. W., Washington 6, D. C.

Industrial Hygiene News Report, Flournoy & Associates, 1791 W. Howard St., Chicago 26.

Industrial Medicine and Surgery, P. O. Box 44306, Miami 44, Fla.

Journal of American Insurance, 20 N. Wacker Drive, Chicago 6.

Journal of the American Medical Association, 535 N. Dearborn, Chicago 10.

Missiles and Rockets, 1001 Vermont Ave., Washington 5, D. C.

Modern Sanitation and Building Maintenance, Easton, Pa.

National Engineer, 176 W. Adams St., Chicago 3.

The National Provisioner, 15 W. Huron St., Chicago 10.

Pacific Factory, 709 Mission St., San Francisco, Calif.

Pulp and Paper Magazine of Canada, Gardenville, Que., Canada.

Wood and Wood Products, 59 E. Monroe St., Chicago 3.

Floors

—*From page 21*

flooring is useful for stair treads, elevator sills, and thresholds.

Vinyl plastic, usually in tile form, is durable, decorative and relatively high in price. It resists acids, alkalis, and most organic solvents. The surface is non-porous and easy to keep clean.

Wood block is widely used for heavy duty general purpose floors. It is durable, relatively quiet and comfortable under foot and does not become slippery. Blocks laid on a smooth, rigid base will stand up under heavy trucking and are not likely to crack. Blocks impregnated with creosote resist dampness.

Blocks should be set in high-melting-point pitch. Ordinary pitch or tar filler may stick to wheels and shoes in hot weather.

Wood plank. Close-grained wood is comfortable and reasonably durable under foot traffic. Under moist conditions, boards may swell and buckle. A heavy subfloor makes surface flooring more resistant to moisture and traffic. Under heavy wheel traffic, boards may loosen or break frequently. A penetrating floor seal protects the surface and makes cleaning easier.

Fabric surfacing. Heavy fabric coated with mineral grains is used indoors and out for stair treads, ramps, and around machines. The material can be applied to concrete, metal, or wood. It is backed with adhesive to the surface under pressure. It wears well and resists water, oil, and weather.

Steel plates are serviceable for platforms, stair treads, floors and hatchways. They wear well and are easily cleaned but are noisy and highly conductive of heat.

Extruded patterns offer good traction and resistance to slipping. When worn, plates can be roughened with a welding torch.

Steel plates are also used over ducts which carry electric circuits or pipe lines. They are easily assembled and can be removed for servicing equipment.

Grating is particularly useful around boiler rooms, over openings, for platforms and stair treads. It does not collect dirt, liquids or snow and permits circulation of air.

Magnesite is suitable for light traffic. It must be laid on a rigid base. It should not be used where there is excessive moisture or hydrostatic pressure, as in basements. It is resistant to oil. A coat of bituminous paint should protect metal surfaces in contact with magnesite since it corrodes some metals.

Terrazzo is durable and easily maintained. Abrasive aggregates in the mixture provide a non-slip surface. Sealers make it impervious to most acids. Where there is excessive foot traffic, as in building lobbies, rubber mats reduce slipping hazards and protect the surface.

Lead is used for floors exposed to acids and as insets or mats for secure footing in operation of woodworking machines or other places where the results of a slip and fall would be unusually serious. Lead is conductive to heat, nonsparking, and quiet.

Zinc is non-sparking and sometimes used in such locations as compounding rooms where fire and explosion hazards exist. Zinc is not resistant to acids and alkali.

Conductive floors. For explosion-hazardous areas, where static electricity must be prevented, conductive floors are indicated. Concrete can be made conductive and non-sparking with surfacing compounds containing nonferrous metallic aggregate.

Resilient materials of normally high dielectric strength are also available in conductive grades. These include linoleum and asphalt, rubber, vinyl and ceramic tile.

Special cleaners for conductive floors are recommended. * * *

TO PRESERVE FLOORS

Adopt a regular cleaning and inspection schedule. Neglect means increased cost of cleaning and repairs.

Check methods and equipment. Is the area large enough for mechanical equipment?

Don't flood floors—except concrete or other impervious material with a drain. Wood block, hardwood plank and magnesite may be damaged. In general, use as little water as possible.

Remove oil and grease promptly. Commercial absorbents are more efficient than sawdust and avoid fire hazards.

Consult the manufacturers about your problems.

Resilient mats on hard floors reduce fatigue and slipping hazards.

Heads Protected

—*From page 98*

No standards have yet been compiled for the use of color for identification of the wearer. Many civil defense groups have established codes and some industries have adopted similar plans. Following is a typical code:

Red—Pipe workers.
Blue—Fitters.
Green—Welders.
Buff—Rigging.
Yellow—Electrical.
Black—Labor.
Gray—Burning.
Brown bottom, white top—Painters.
Red bottom, blue top—Machinists.
Gray bottom, white top—Shear and blacksmith shops.
Lavender—Expediters.
Aluminum—General foremen.
Brown bottom, yellow top—Caulkers and sanders.

A black line on a helmet denotes a foreman and a red line a leaderman. Badge numbers are also stenciled on the front of each helmet.

Work Caps

Where protection against impact is not required, light cloth or paper caps are worn to protect the hair against paint splashes, dust, oil, and other non-corrosive substances.

One type of disposable work cap

ZEPHYRAIR

ACME GAS MASKS

Acme's New Improved

Constant Flow Design

"CA" MASK

(COMPRESSED AIR)

PERMISSIBLE
SUPPLIED-AIR RESPIRATOR, TYPE C

APPROVAL **NO. 198-31**

ISSUED TO THE
ACME PROTECTION EQUIPMENT COMPANY
South Haven, Michigan, U.S.A.

Approved for respiratory protection in any atmosphere not immediately harmful or from which the wearer can escape without the aid of the respirator.

Approved only when the assembly consists of: (1) BM-198-31 facepiece, BM-198-31 filter-detachable coupling assembly, and BM-198-31 hose; or (2) BM-198-31 facepiece, BM-198-31 filter-detachable coupling assembly with BM-198-31 airflow control valve, and BM-198-31 hose.

This approval applies only when the respirator is supplied with respirable air within the pressure range of 8 to 17 pounds per square inch through 15 to 50 feet of hose, or within the pressure range of 17 to 30 pounds per square inch through 50 to 250 feet of hose.

CAUTION

This respirator must not be worn in any atmosphere immediately dangerous to life.

Follow the manufacturer's instructions for providing a supply of respirable air, for installing, adjusting, using, cleaning, maintaining, and storing the device.

FOR USE IN:

Routine Mixing, Cleaning And Maintenance Jobs.
In Welding—By Specifying Acme Pur-A-Weld Face Piece. U.S.B.M. Approved.
Leading And Grinding Operations With Hood Covers.
Tank Cleaning Under Approved Conditions.
Unbearable Or Irrespirable Conditions Where A Long Stay Is Anticipated.

The Acme "CA" Mask Outfits will do the following:

1. Provide The Best Air Control To The Wearer With The Least Adjustment.
2. Permit The Wearer To Do More Work With Less Fatigue.
3. Give Comfortable Fit Over Longer Periods.
4. Provide Acceptable Speech Transmission.
5. Give Safer Work Conditions Due To The Greater Vision.
6. Cost Less In The Long Run Due To Less Maintenance Cost.
7. Give Greater Interchangeability Of Accessories.
8. Protect The Wearer From Blasted Eyeballs If TOO MUCH Air Is Turned On.

Write for circular #597

MANUFACTURED BY THE ONLY EXCLUSIVE MANUFACTURER OF INDUSTRIAL GAS MASKS

ACME PROTECTION EQUIPMENT COMPANY

1209 Kalamazoo Street **South Haven, Michigan**

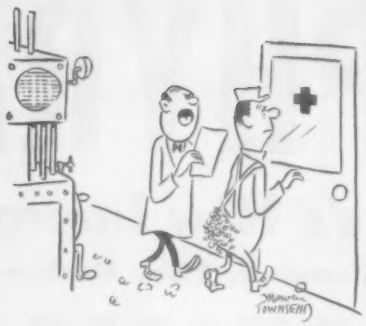
is of heavy Kraft paper treated with neoprene and a flame retardant. The material is water-repellent and resistant to acids and alkalis.

Headwear for Women

Women are seldom employed in peacetime occupations where protective hats are required. Their hair, however, provides a problem around moving machinery. Much effort has been expended in designing headwear that provides adequate protection and is reasonably attractive in appearance. Much more effort is expended in persuading women to wear it.

Scalping may occur at points where hair may come in contact with rotating parts, or where enough static is produced by the machine to lift the hair.

Enclosing the machine may be practicable in some operations but women who work around machinery should wear caps which cover the hair completely. Hair covering is generally desirable from the standpoint of cleanliness.



"After the doctor releases you, Chester, I'd like to have a little talk with you on the subject of sitting down on the job."

Hair covering should be made of durable fabric which will withstand repeated laundering. Design should be simple so that pressing may be done by machine.

Flame-retardant material should be used if worn near sparks or flame.

Caps with peaks provide warning before the head comes into contact with a moving object. They should be provided in a sufficient variety of head sizes or with a range of adjustment to fit all persons.

Hair nets, turbans, or berets, preferred by many women, are not considered sufficient protection around moving machinery. Sometimes their use is a compromise with feminine taste. * * *

Vision Tests Include . . .

Near acuity. Ability to focus and see well with both eyes separately at a distance of 15 in. This is the distance at which most machine and office work is done.

Distance acuity. Ability to focus eyes at a distance of 20 ft. or more. This is necessary for such occupations as crane operators, truck drivers, and railroaders, for example.

Field of vision. Ability to see to both sides, and up and down, while focusing on a small target.

Depth perception. Ability to judge space relationship. This is important for accuracy in almost any job.

Low cost hairgards add fashion to safety

Hairgard No. 21

Fashion designed StaSafe Hairgards, in a wide variety of flattering colors, are tailored to today's women. Modern styling of mesh Hairgards match good looks with safety. Solid cap styles are popular for protection against dust, oil mist and possible scalp infection. Snood models, in either mesh or solid material, are designed for long hair styles.

Hairgards are also available with your slogan or emblem printed in one contrasting color. Helps make your safety program a morale builder. Strengthens pride in department, work, company and safety record.

Hairgards bring stylish fashion along with better safety into your plant.

Write today for your free copy of the HAIRGARD BROCHURE.

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Fixed Safety Margin + Comfortable Fit

There's no gamble with safety when workers adjust this new Jackson safety hat headgear for good fit and comfort. The 1¼ -inch inside distance over the top of the head is there to stay.

Headgear consists of CRADLE and HEADBAND, connected by four "T"-STRAPS; all are made of polyethylene. This assembly is pliable, resilient, shock absorbing. It also holds its shape and is smooth, without pressure points. It is easy to clean, even without removal from hat or cap.

CRADLE fastens firmly to the hat shell, providing a permanent distance of 1¼ inch between head and inside of shell, measured under 25 pounds of pressure applied to top of hat.

HEADBAND with all-around, soft-lined leatherette sweatband is adjustable to clearly marked hat sizes from 6¾ through 7½, and is inexpensive to replace.

"T"-STRAP CONNECTION allows about ¾ inch of headband height adjustment without disturbing the fixed crown safety.

This new headgear will be standard at no extra cost on JACKSON FIBER GLASS HATS and CAPS which, as before, pass all physical requirements of Federal Specification GGG-H-142b and on the ALUMIHAT and ALUMICAP which fill the same requirements except for electrical resistance.

ADD TO THE SAFETY AND COMFORT of your present Jackson Hats and Caps (fiber glass and aluminum) by replacing old headgears with this new, all-plastic, fixed-crown safety headgear.

JACKSON FIBER GLASS SAFETY HAT AND CAP
Chin straps of high quality elastic webbing are available to fit all Jackson safety hats and caps.

THE JACKSON "ALUMIHAT" AND "ALUMICAP"

"WINTERIZERS" FOR SAFETY HATS AND CAPS
Calcap **to protect the skull,** ***Frigicap*** **(right) with adjustable chin strap to protect the ears as well.**

Sold Everywhere by Better Welding Supply and Safety Products Dealers

Jackson Products
A DIVISION OF AIR REDUCTION CO., INC.
31739 Mound Road, Warren, Michigan

Nondestructive Testing

—*From page 12*

may cause the object being tested to become heated. In such cases, the operator should be supplied with heat-resistant gloves.

66. In the field of radar-frequency testing, instances of operators being burned internally when they passed between the object being tested and the testing device have been reported. Special regulations should be formulated and enforced, and barriers should be set up to prevent operators and other workers from entering such areas. Recommendations of the manufacturer of the equipment should be followed explicitly.

67. *Fire prevention.* On operations requiring the use of oils (which in a number of cases have been replaced by waterbase solutions) as a part of the testing procedure, proper precautions should be taken to eliminate the possibility of fire. No smoking should be permitted in the area, and other fire preventive measures should be instituted, as outlined in National Fire Protection Association regulations.

68. In the use of magnetic particle magnetizing equipment, arcing may occur. Therefore, such equipment should not be used in an area where combustible gases or vapors may be present.

Precautions for Radiography

69. Because of the severity of the hazards involved, numerous precautions must be carefully followed for safe use of radiographic techniques.* Only a few of those precautions will be indicated here. For example, permanent protective barriers and shielding are required for X-ray installations to protect personnel in the area from radiation exposure.

70. In some cases, radiographic equipment must be taken to the material to be inspected. The problem of protecting employees who work with or near portable equipment is more difficult than that encountered with permanent installations.

71. Each applicant for radiographic work should have a complete preplacement medical examination, including a differential blood examination and such other special determinations as are outlined in National Bureau of Standards Handbook 60, *X-Ray Protection,* or specified by the plant physician. The frequency of subsequent physical examinations should be decided by a physician on the basis of the types and conditions of equipment installation and the amount of exposure.

72. Each person required to handle radiographic equipment should be supplied with a properly calibrated film badge and two pocket dosimeters. The dosimeters should be reset by means of a dosimeter charger at the end of each 8-hour work period. If the devices indicate that the wearer has received a dose near or above the maximum permissible, he should be examined by a physician familiar with nuclear medicine.

73. Permissible dosages are given roentgens or milliroentgens as measured in air. The term "measured in air" means that the radiation rate is determined by placing an instrument such as a condenser r-meter in the path of the radiation beam. No solid material, including the human body, should be nearby, because it will scatter the radiation and an incorrect reading will result. Permissible doses should not exceed those given in NBS Handbook 59* or its latest supplement.

74. Areas in which X-rays or radioisotopes are being used should be monitored continuously or periodically, depending upon the conditions. Special radiation detection instruments which are rated for the energy of radiation they are expected to measure should be used to determine doses. Such instruments are ionization-chamber-type survey meters, dosimeters, film badges, and ionization chambers.

75. Precautionary measures to protect radiography operators and workmen are relatively complex and should be thoroughly understood and adhered to. Safety measures should be instituted, with a full realization of the hazards involved, to protect not only the operators, but also bystanders, whose maximum permissible dose is one-tenth the maximum permissible dose for those occupationally exposed.

76. To establish safe distances, a careful radiation protection survey should be made with an approved and calibrated survey meter by a qualified physicist or technician. Such a survey will provide the necessary data for establishing minimum safe distances that personnel must abide by.

77. Hazardous areas, as indicated by the protection survey, must be barricaded or roped off to form a restricted section which must not be entered by bystanders. The boundaries should be well marked by large signs bearing the radiation symbol, with "RADIATION AREA" imprinted on them. The use of strategically placed blinking or rotating amber lights is also recommended. They should be turned on to allow for a warning period before the operation starts and should remain on until the operation is completed or until the area has been cleared.

78. Only qualified physicists, radiographers, or technicians should be in charge of radiography equipment. They should be responsible for establishing and maintaining restricted areas. Their hats or clothing should be of a distinctive color so that unauthorized personnel can be quickly spotted and removed from the area. Either the work area should be so arranged that the man in charge can see all boundaries of it at all times, or he must have an assistant to keep watch for him.

REFERENCES

American Society for Testing Materials, Philadelphia 3, Pa.
A Technique for Gamma Radiographic Inspection of Parallel-Plate Fuel Assemblies
Measurement for Complete Flat-Plate Fuel Element Subassemblies
Nondestructive Bond Inspection Test by Electric Resistance
Nondestructive Testing
Tentative Recommended Practices for Radiographic Testing, No. E-94-52T

—*To page 118*

*See the National Safety Council's *Accident Prevention Manual for Industrial Operations,* 4th edition, and Data Sheet 475, *X-Rays in Industry,* for detailed discussions of hazards and precautions.

*NBS Handbook 59, *Permissible Dose from External Sources of Ionizing Radiation.*

711

New "Duo-Tone" plastic frame safety glasses with S-7 interchangeable lenses. Rigid construction.

100S

New "Guest-Goggles" with Side Shields for extra visitor safety in semi-hazardous conditions. Fit over Rx glasses, if desired. Available in clear or green.

100 —Same as 100S, without Side Shields.

700S

New plastic frame safety glasses with flesh color frames and side shields. S-7 lenses, vinyl temples.

700

New "Squared Shape" plastic frame glasses with S-7 interchangeable lenses. Vinyl coated temples.

328

New fibre glass face shield, with ratchet headgear. Detachable windows; resists heat and moisture.

810

New extra-large, lightweight vinyl "soft sides" with easy lens replacement, more comfort, better ventilation.

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—*From page 116*

American Society of Tool Engineers, Detroit 38, Mich.
A.S.T.E. Handbook.

Battelle Memorial Institute, Columbus 1, Ohio
Nondestructive Testing of Engineering Materials and Parts, Material Methods Manual No. 67

Magnaflux Corporation, Chicago 31, Ill.
Defects and the Strength of Materials, A. V. DeForest
Instructions for NDT with Zyglo
Operator Inspector Guidance Charts
Preventive Maintenance Inspection Manual
Principles of Magnaflux
Principles of Partek
Principles of Statiflux
Principles of Stresscoat

National Bureau of Standards, United States Department of Commerce, Washington 25, D. C.
Metals Do Not Crystallize Under Vibration
Permissible Dose from External Sources of Ionizing Radiation, Handbook 59
Photographic Dosimetry of X- and Gamma Rays, Handbook 57
Protection Against Radiations from Radium, Cobalt-60, and Cesium-137, Handbook 54
X-Ray Protection, Handbook 60
X-Ray Protection Design, Handbook 50

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Accident Prevention Manual for Industrial Operations, 4th edition
Beta Ray Sealed Sources, Data Sheet 461
Cathode Ray Tubes, Data Sheet 240
Introduction to Radioisotopes, Data Sheet 329
X-Rays in Industry, Data Sheet 475

Nondestructive Testing Society, Evanston, Ill.
N.D.T. Handbook

Office of Technical Services, Department of Commerce, Washington 25, D. C.
Radiation Safety in Industrial Radiography with Radioisotopes, AECU-2967

Society of Automotive Engineers, New York 17, N. Y.
S.A.E. Handbook

Technical Information Service, National Research Council, Ottawa 2, Ontario, Canada
Nondestructive Tests for Detecting Faults in Metal Parts

ACKNOWLEDGMENT

This data sheet is based upon material originally provided by the Chicago Chapter of the American Society of Safety Engineers. Special acknowledgment is made for technical assistance provided by the National Research Council and members of the Nondestructive Testing Institute. Final drafts have been extensively reviewed by members of the National Safety Council and representatives of chapters of ASSE. The data sheet has been approved for publication by the Publications Committee of the Industrial Conference of the National Safety Council.

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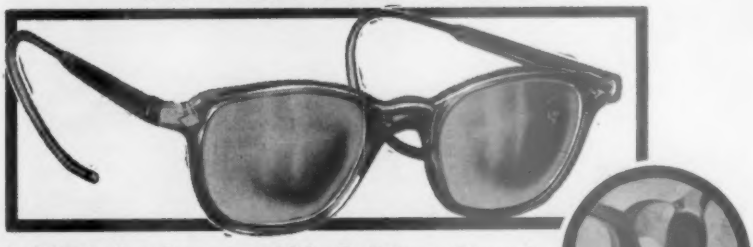
SAFETY SPECTACLES
FIT EVERYBODY!



2 Models Cover ALL Bridge Sizes!
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Model 7448 — fits 22, 24 and 26mm bridge sizes
Note how each fits a 22mm bridge size

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Statler Hilton, New York
March 29th, 30th, 31st

Glendale's new UNISPEC TWINS with revolutionary bridge design fit every face easily, comfortably. They represent a new advance in styling of industrial spectacles by incorporating ALL bridge sizes to assure universal fit, and unqualified approval of safety directors.

Full details and specifications on request. Write for new 1960 catalog

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Eye Protection

—*From page 97*

der helmets in arc welding, particularly gas-shielded arc welding).

No. 4—Same as shades 1.5 to 3.0, but for greater radiation intensity.

No. 5—For light gas welding and cutting and light non-gas-shielded electric spot welding.

Nos. 6 and 7—For gas cutting, medium gas welding, and non-gas-shielded arc welding using current values up to 30 amperes.

No. 8—For heavy gas cutting and non-gas-shielded arc welding using current values from 30 to 75 amperes.

No. 10—For arc welding and cutting using current values from 75 to 200 amperes.

No. 12—For arc welding and cutting using current values from 200 to 400 amperes.

No. 14—Arc welding and cutting using current values over 400 amperes, including carbon arc welding and cutting, and for atomic hydrogen welding.

Transmittances and tolerances in transmittance of various shades of filter lenses will be found in *ASA Code Z2.1-1959.*

Goggles are available in shades up to No. 8; higher numbers in helmets.

Heat-treated filter lenses are also available, or impact-resistant cover lenses may be used to protect filter lenses against pitting and scratching. * * *

Food Service

—*From page 68*

Refrigeration is needed for all perishable foods, particularly custard and cream-filled pastry, dairy products, meat and fish, gravies, poultry stuffing, and dressings or salads containing meat or fish. These should be kept at or below 40 F, except when being prepared or served.

Dishwashing. Either machine or hand dishwashing can maintain adequate standards. Machines can use stronger detergents and hotter water

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8-1008

Here's why cost-conscious plants buy Koolpads every summer

When a worker has to stop frequently to mop his forehead and wipe his glasses, his production efficiency has to drop.

That's where Koolpads come in. Every lightweight, cellulose sponge Koolpad holds six times its own weight in perspiration! Production delays to mop foreheads and wipe glasses are cut to an absolute minimum. In addition, a Koolpad dampened slightly in water before wearing gives a refreshing "lift" that helps shrug off some of the effects of stifling heat . . . . the immediate result is often improved production.

Each Koolpad is packed in a clean, neat envelope as an extra sanitary precaution. Also, every Koolpad has an easily adjustable elastic headband for a comfortable fit.

● **Insist on Koolpads, the sweatband with all these features . . . and the sweatband that can be rinsed in seconds and used over and over again.**

STANDARD SAFETY EQUIPMENT COMPANY

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than hands can tolerate. With handwashing, rinsing as well as scrubbing is important. If the rinse water is likely to fall below the required temperature, a hypochlorite solution is helpful.

Coffee breaks have become an established institution. Passes of 10 to 15 minutes in the morning and afternoon for coffee, milk or soft drinks help prevent fatigue. * * *

What to Look for When You Buy

No special hazard is involved in use of many of the items in an industrial plant. Selection may be governed by price, appearance, durability, or some other factor. However, many products have an important bearing on safety or health.

For personal protective equipment, careful selection is important. Goggles, hard hats, respirators, safety shoes, and garments are bought primarily for protection. Some of these items are covered by ASA standards, by approval labels of the U. S. Bureau of Mines and independent laboratories, and other certification. In this field, many companies have been in business for years and the reputation of their products is unquestioned.

Safety is important in selection of equipment for movement of suspended loads, such as rope, chain, and slings. In equipment for movement and storage of materials, operating efficiency and economy often are the reasons for buying, but the effect on hazards is scarcely less important.

Solvents used for cleaning may constitute or aggravate a fire or health hazard. Most of those substances in use for some time have been rated according to hazards involved in their use.

For fire protection equipment the lists of approved products issued by Underwriters' Laboratories and Factory Mutual Laboratories are recognized guides.

Lists of equipment bearing the label of Underwriters' Laboratories include: fire protection equipment; accident, automotive, and burglary protection equipment; hazardous locations equipment; electrical construction materials; electrical appliance and utilization equipment; and gas and oil equipment.

For all gas-using equipment, the list issued by the American Gas Association is a useful and dependable guide.

All products approved by these organizations carry conspicuous labels.

Unsuspected hazards may lie in use of ordinary items, such as common hand tools, tool racks, cleaning rags, and paints used for industrial interiors and machines.

Specifications will include:

1. Long life without deterioration.
2. Maximum load strength.
3. Hazard to the worker's health.
4. Minimum fatigue in use.
5. Absence of rough, sharp, or pointed characteristics in objects that must be handled.
6. Ease and economy of maintenance.

Wire from Washington

—From page 106

standards. The FAA also stressed training as a cure for the rising accident rate.

The congressional inquiry into air safety has disclosed a vigorous dispute over the severity and efficacy of the FAA's safety enforcement program. The Air Line Pilots Association testified that FAA was not "achieving its over-all safety objective" and with one exception "none of the regulations adopted by the FAA would have prevented any of the accidents which occurred in 1959."

The ALPA objected to surveillance "as to whether they are legal [rather] than to whether they are operating safely and within their good judgment." The pilots union labelled inadequate airports and terminal facilities, lack of modern navigation aids, and a "petty harassment" in regulation as major safety hazards.

To these and other industry objections, the federal aviation administrator replied: "I refuse to yield to this pressure—I refuse to be intimidated."

The Air Force announced a drop of 20 per cent in its major aircraft accidents to an all-time record low in 1959. The 1958 rate was 10.4 per 100,000 flying hours; the rate declined to 8.3 in 1959. The Air

WORKER COMFORT PLUS!

Featherweight Enduron plastic safety lenses are half the weight of glass!

Some workers just can't take the weight of regular safety glasses. But the minute glasses come off the face may be the minute tragedy strikes! Safety frames with B&L Enduron lenses are the answer. They are available in plano and prescription types.

Enduron is a tough, shatterless plastic, with a specific gravity only half that of glass. Its feathery-lightness is of particular advantage in high correction lenses where thickness adds weight, and in nasal fitting problems where slippage occurs.

Enduron is extremely hard, clear and colorless. It is comparable to glass in impact-resistance and resists organic solvents, acids and alkalis in industrial concentrations. There is little or no fogging.

Mounted in strong, durable, Bausch & Lomb safety frames, Enduron lenses give full eye protection with the fullest possible measure of comfort. Want to see samples? Phone your supplier of Bausch & Lomb Safety Products, or write Bausch & Lomb Optical Co., 90303 Lomb Park, Rochester 2, New York.

Enduron plastic lenses fit all Bausch & Lomb spectacle-type safety frames. Shown above is the popular solid color plastic frame Y-62.

BAUSCH & LOMB

Protection-PLUS Safety Products

protection + economy + worker acceptance

Force credited the improved safety record to better maintenance, education and training methods.

Home Safety. The House Committee on Interstate and Foreign Commerce held hearings on H.R. 7624, the administration's color-additive amendments to the Food, Drug and Cosmetics Act. The secretary of the Department of Health, Education and Welfare favored the bill which would extend the ban on cancer-inducing chemicals to apply to color additives in foods, drugs and cosmetics.

Under present law, the government must prove a color is not harmless *after* it is in use; the amendment would require the manufacturer to prove it is safe before it can be used and would authorize the government to permit use of a color not harmful within prescribed tolerances as long as it did not cause cancer in man or animal.

The Food and Drug Administration, after two years of testing, banned the use of 17 colors in lipsticks, on the ground they caused "definite injury" when ingested by test animals. Congresswoman Leonor Sullivan (Mo.) urged broad legislative action requiring safety pretesting of all cosmetics.

The deputy commissioner of food and drugs stated that there is no comprehensive federal safety protection against chemical products used in the household and on the farm (except for pesticides, food additives, drugs and cosmetics).

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Offices Have Hazards, Too

OFFICES, normally, are free from the more hazardous operations, but they do have accidents. Exhibits of office hazards have included between 25 and 30 possible accident causes. Slipping and tripping hazards lead the list.

Good lighting and ventilation, clean washrooms, and various employee services are aids to health, safety, and morale. Good layout of office space and careful housekeeping and maintenance also have far-reaching benefits.

Layout. Work should flow through the office with a minimum of backtracking.

Transportation distance of work should be kept at a minimum. Desks should be arranged so each worker will receive his work from the person behind or beside him.

Heavy equipment should be placed against walls or columns.

Filing cabinets should be placed against walls or railings.

For most office operations desks should face in the same direction. Where two persons work together, they may face each other.

Employees should be placed in front of or around the person having supervision over them. Those using the same machine should be grouped.

Space. Business expansion may result in installing more desks and other equipment than originally planned. Overcrowding is bad from the standpoint of appearance and the psychological effect on employees. It may also overtax the ventilating system.

A suggested minimum width for aisles is 4 ft. For desks facing the same direction, distance between the

front of one desk and the back of another should be not less than 3 ft. More space is desirable.

Light. Fluorescent lighting, with high efficiency and low current consumption, has made possible great improvement in lighting and more efficient use of floor space. To insure adequate levels, light meter readings should be taken at work surfaces.

If the office depends largely on daylight, employees engaged in the more exacting visual tasks should be located near windows. North light is preferred by draftsmen and artists.

Employees should not have to face windows, unshielded lamps, or other sources of direct or reflected glare. Wall and other surfaces should be painted in light tints to conserve light but avoid reflection.

Ventilation. Stale air is a common cause of fatigue and low production. Window ventilation is often unsatisfactory. Those near open windows may feel cold, while those farther away are too warm. Where there is much interior space, forced circulation may be necessary. Extensive installations should be designed and installed by experienced ventilating engineers. More and more offices are being air-conditioned—a strong point in attracting and keeping good employees.

Noise reduction. Sound-absorbing materials for ceilings are desirable, even where normal noise levels are not considered excessive. Noisy machines should be isolated.

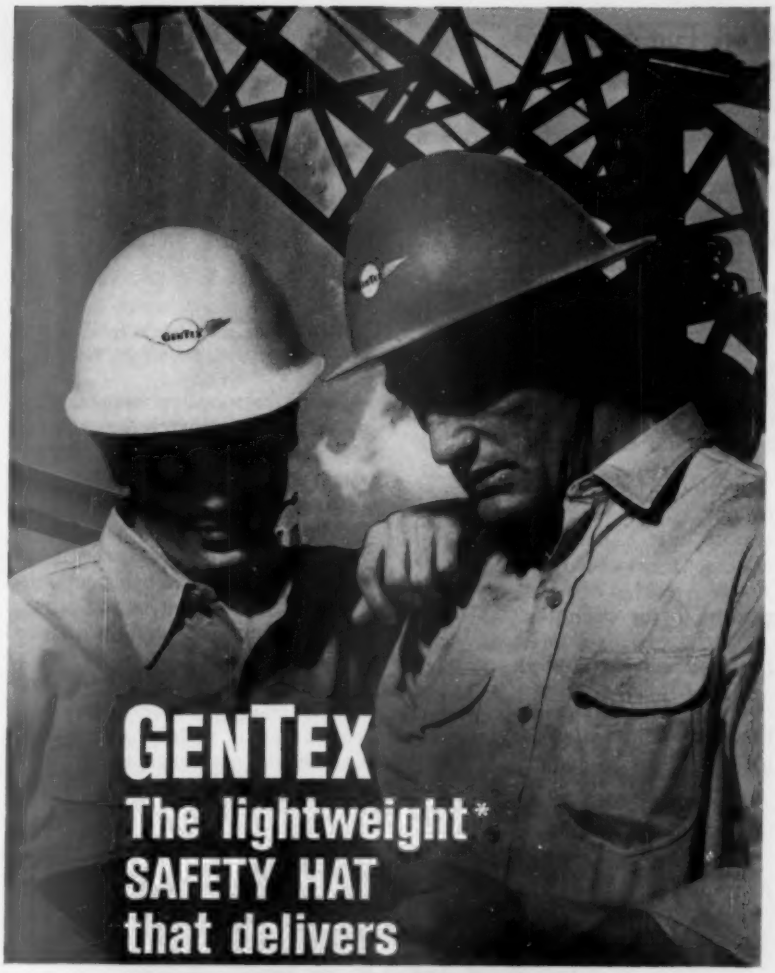
Electricity. All electrical equipment, such as desk lamps, dictating machines, typewriters, and computing machines, should be grounded, preferably by cords with 3-prong plugs and outlets to accommodate them. Insulation on cords should be checked frequently.

Extension cords should be arranged to avoid possibility of tripping.

Floors. Defective boards or tiles should be repaired immediately. Floor finishes should be selected for slip resistance.

Slip-resistant material should be installed on stair treads and at elevator entrances.

Glass doors should be painted at eye level with a conspicuous design to prevent persons walking into them.



IMPACT RESISTANCE
better than 40 foot-pounds

AND PENETRATION RESISTANCE
less than ¼" penetration in 10 ft.-pound plumb bob test
(Federal specs allow ⅜")

PLUS DIELECTRIC RESISTANCE
up to 10,000 volts

AND ALL DAY COMFORT

Exclusive no-wrinkle headband conforms to head contour, eliminates pressure on temples. 6-point suspension system, designed on same principle as jet pilot helmets, keeps hat in *positive balance* always—no more end-of-shift strain and fatigue. POLYETHYLENE shell won't crack at brim or crown when dropped—even on concrete. Smooth, modern design with choice of 9 colors impregnated right in the plastic for handsome appearance and instant job classification. Snap-in nylon and plastic headband with fingertip control, fully washable. Adjustable, self-storing chinstrap and winter liners available. Brim and peaked-cap models. **12½ oz. to 12⅞ oz., depending on impregnated color pigment.*

We would be pleased to submit full details and a hat for testing—just drop us a note on your company letterhead.

Foremost manufacturer of helmets for military, industrial, civic and sports use.

GENTEX CORPORATION, 450 7th AVE., NEW YORK 1

Circle Item No. 78—Reader Service Card

Work Furniture That Saves Energy

FURNITURE of good design for shop and office promotes efficient work with maximum comfort and minimum fatigue.

Perhaps the most important thing to remember is that men and women differ in sizes and proportions and furniture must be adjusted to the needs of the individual.

Alternate periods of sitting and standing at work reduce fatigue and boredom. If this is not practicable, furniture should be planned for comfort and efficiency.

Work surfaces. The height of benches, machines, tables, and assembly lines is determined by two principal factors: Do workers sit or stand? Are eyes or hands more important to the operation?

Tilted or recessed tables are helpful in some types of work.

Seating. A factory chair should be comfortable, safe, easily adjustable, and easy to maintain.

"Plant all automated, one button to push, and you spill hot coffee on yourself!"

Height relationship between seat and work is important. Since workers differ so widely in physical proportions, seat height should be adjusted accordingly.

A chair should have a back rest to support the back between lower ribs and hips. Without this support, much energy is used in just sitting erect. A slumping posture leads to early fatigue.

A form-fitting seat of the tractor or bucket type is better than one that is flat or slightly curved. The seat should not touch the tendons and blood vessels on the back of the leg just above the knee.

Too soft a seat is not desirable. Contour is more important than padding. Edges and corners should be rounded to avoid damage to clothing or injury to persons. * * *

Industrial Hygiene Course For Safety Engineers

A course on industrial hygiene for safety engineers is scheduled March 21-25 at the National Safety Council in Chicago. Instructors are experienced specialists in their fields.

Subjects covered will include dermatitis, noise control, dust control, radiation, solvents and gases and instrumentation.

Also slated is a one-day visit to an industrial hygiene lab where each student can work with instruments to become familiar with testing procedures.

To enroll, contact: Director of Industrial Training, National Safety Council, 425 N. Michigan Ave., Chicago 11.

*Pat. pending

new SHOULDER-MOUNTED GRA-LITE HOOD...

as light and comfortable as a jacket

An ingenious system of sealed-in wires makes this hood effortless to wear. Every ounce of the lightweight hood is carried on the worker's shoulders. There is no headgear simply because there is no need for one!

Magnetized rubber stripping sealed into the Gra-Lite, holds the "fishbowl" window in place and keeps a liquid-tight closure. Two ventilation ports in back keep air coming in . . . and keep the window fog free. And, look at that window! 20"wide, 12½" high and .040" thick. Over half the circumference of the hood is window!

Write today for complete information on The Shoulder-Mounted Hood, (SD 4196)

STANDARD SAFETY EQUIPMENT COMPANY
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604 BROADWAY NEWARK 4, N.J.
12921 W. WASHINGTON BLVD. LOS ANGELES 66, CALIF.
855 EAST 152nd STREET CLEVELAND 10, OHIO

Light

—*From page 30*

Photoelectric cells can maintain an even level of light, turning on artificial lighting when illumination falls below specified level.

Special Fixtures

Where lighting equipment is required for special uses or subjected to abnormal conditions, many types of lamps and fixtures are available.

Glow lamps are used as signal, pilot and night lights. They are not practical for general illumination.

Shock-resisting lamps are constructed to withstand shocks and bumps. They are used chiefly with portable fixtures on extension cords. Where possible, the use of low-voltage (6-12 v.) can often improve lamp performance.

Vibration lamps have a more flexible tungsten filament and special support. Since vibration and shock frequently occur together, testing both lamps will tell which gives longer service. Fluorescent and mercury vapor lamps are a good choice where shock or vibration is present.

Weather-resistant lamps are used for outdoor lighting in industrial plants, docks, arenas, etc. They stand exposure to rain, sleet and snow without cracking.

Explosion-resistant fixtures are used where dusts, gases, fumes and vapors may create a hazardous atmosphere. These are available for use with incandescent and mercury vapor lamps. For the latter, ballasts should be located outside the hazardous areas.

Infrared lamps, in types and sizes up to 5,000 watts, are used for baking, drying and heating, as well as for therapeutic use.

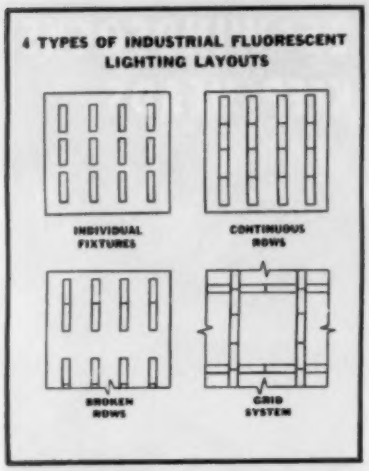
Maintenance

Efficient lighting requires a systematic maintenance program. Equipment may meet all requirements when installed but dust and grime immediately start reducing light output.

The first step in a maintenance schedule is to check illumination periodically with a light meter. When light drops to 75 per cent of its original value, lamps and reflectors should be washed with warm water and a mild detergent.

Group replacement of lamps—both filament and fluorescent—is often practicable and desirable. The saving in cost of replacing a large number of lamps at one time is greater than the value of the remaining light output of the lamps. Point of replacement is usually 60 to 80 per cent of the rated lamp life.

Disconnecting hangers permit lowering fixtures to the ground or the floor for cleaning, relamping and repairs. Much climbing is eliminated.



Four types of industrial fluorescent layouts. (Sylvania Electric Products, Inc.)

Outdoor Lighting

Outdoor lighting for night work or to detect trespassers is required by many industrial plants. Where work is done outdoors after dark, levels must be higher than those needed chiefly for plant guards to spot intruders and detect unusual activities and conditions.

Light sources should be shielded and aimed so that the area can be seen clearly. Light can be directed to form a "glare barrage" in the direction from which intruders might approach the plant.

Emergency Lighting

Where power failure would endanger life, an emergency lighting

Have you Checked the QUALITY of SAFETY GOGGLES lately?

compare
GATEWAY
EYEGARD line of GOGGLES
FEATURE FOR FEATURE
PRICE FOR PRICE

● You are required to provide "eye protection" for your workers . . . but you *are not required* to pay premium prices for it. You can save money and get top quality safety goggles and spectacles by asking for "EyeGard" every time. A comparison of features will show you that EyeGard provides the finest in both comfort and protection . . . and provides the right style and type for every requirement. Why not get the "facts" by writing for a catalog and prices today? You'll be money ahead!

No. 1475 "Vista-View" Cover Goggles
No. 500 "Imperial" Welder's Cover Goggles
No. 31 "Champion" Chipper's and Grinder's Cup Goggles

AMERICAN INDUSTRIAL SAFETY EQUIPMENT CO.
3501 LAKESIDE AVENUE CLEVELAND 14, OHIO

Circle Item No. 79—Reader Service Card

25¢ WINDSOCKS KEEP HEADS WARM

Snug, warm stocking cap for men who wear hard hats in winter. Stockingette weave easily expands to any head size. With Windsocks there's no time lost installing permanent type liners.

Order a trial dozen today.
Only $3.00 plus postage.

Standard Safety Equipment Company
431 N. Quentin Road, Palatine, Ill.

IMPORTERS WANTED

FOR SAFETY HATS AND CAPS OF GERMAN PRODUCTION, OF LAMINATED PLASTIC, FIBREGLASS, NYLON OR ALUMINUM ALLOY.

SCHUBERTH-WERK K.G.
BRAUNSCHWEIG,
GEYSOSTR. 19,
WESTERN GERMANY

system should be provided. It should be independent of the general lighting system. Exit, corridor, platform, wharf, and other locations should be included in the system so that persons could find their way out of a building.

Automatic devices should be installed to transfer the lighting load from general to emergency circuits in case of trouble.

Portable systems. For such emergencies as fire, explosion, accidents, or mobs, emergency lighting systems help in rescue work and maintaining order. Portable floodlights with long extension cords can be used near power sources. For remote locations a power unit mounted on a truck is needed.

Standards. Recognized minimum standards of quality in lighting equipment are provided by the RLM Standards Institute. Equipment bearing the RLM label meets the Institute's requirements. These include specifications for type of metal, finish, lamp holders, ballasts and other materials used. * * *

Administering an Eye Protection Program

Supply and distribution. Some companies keep the stock in a central supply department. In larger plants, goggles, shields, and repair parts may be kept in each shop.

In some plants, goggle carts with trained attendants make regular rounds cleaning, adjusting, repairing, and replacing goggles on the job.

Fitting. All goggles, plano as well as prescription, should be fitted carefully. Glasses that don't fit can cause a lot of opposition to eye protection.

Some optical companies offer instruction in fitting plano goggles. Prescription glasses should be fitted by a refractionist.

Cleaning. Goggles and spectacles become smudged and facilities on the job encourage frequent cleaning. Cleaning stations may dispense silicone-treated tissues or cleaning liquid and tissues. Only the latter should be used for plastic lenses.

Sterilizing. Goggles worn by more than one employee should be sterilized before reissue. Ability to withstand sterilizing by accepted methods should be included in any specifications.

Who Pays? For plano goggles, the most common practice is for the company to issue them without cost to employees and to repair or replace those damaged on the job. A deposit may be required to discourage loss of equipment.

Few companies provide prescription goggles without charge but many assume varying percentages of the cost of refraction and the glasses.

A good example. Do supervisors and visitors wear eye protection when circulating in departments where it is required for employees? It makes enforcement a lot easier.

Announce Radiation Safety Training Course

From May 2-6 the NSC Safety Training Institute will offer a course for safety men having radiation sources in their plants. This course is not for radiation experts or health physicists, and will not involve use of higher physics or mathematics.

Instructors will represent the NSC staff, the safety staff of Argonne National Laboratory, and the Atomic Energy Commission.

The course will include a one-day visit to the Argonne lab for demonstration and practice in use of detection instruments and monitoring.

Subjects taught will include common use of radiation, industrial applications of radioisotopes, thickness gauges, density meters, and use of isotopes for X-rays.

A session on source handling will be presented to teach proper, safe source-handling methods, and the distinction between "external" and "internal" hazard problems.

One session will concern records and the necessity for and maintenance of adequate medical records, survey records, etc.

The course also will present sessions on measurements, monitoring and air sampling, facilities for handling, and teaching radiation safety to employees.

Cost of the course, including materials, is $110, less 10 per cent for NSC members. For information, contact: Director of Industrial Training, National Safety Council, 425 N. Michigan, Chicago 11, Ill.

SECTION 6

PERSONAL PROTECTION Part 2

IN SECTION 6:

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Pick Your Outfit 130
Foot Protection 131
Hands and Arms 138
Safety Belts and Harnesses 152
Leg Protection 162
Consultation Corner 172

PARTS OF THE BODY below the neck are exposed to crushing blows, heat and cold, radiation, cuts from sharp edges, and splashes of corrosive materials.

Fingers, for example, get into more danger than most parts of the body but can't be shielded by rigid armor against crushing or cutting from hand or power tools. However, gloves, mittens, and hand pads prevent many abrasions, scratches, burns, and minor cuts.

Fire-resistant garments enable man to survive amid high temperatures. Less spectacular but more generally useful are modern work clothes, designed with safety in mind and made of natural and synthetic fabrics which withstand the exposures of the job.

When it comes to protecting feet, the record is good. Shoes with steel toe boxes have shielded toes from many a crippling blow, without affecting the wearer's mobility.

Thumbs Down on high compensation costs!

CHOOSE *from* WIL-GARD'S TOP-TEN QUALITY LINES!

TEN Quality Lines!
ONE Dependable Source!

INDUSTRIAL GLOVES
Natural Rubber
Soft-Lined Latex
Unlined Latex
Soft-Lined Black Neoprene
Unlined Black Neoprene
Unlined White Neoprene
Buna-N
Compar Plastic
Poly-D Disposable

LINEMEN'S GLOVES
Natural Rubber
Leather Protectors

WIL-GARD

Reduce production losses and compensation costs the dependable, Wil-Gard way! Select from Wil-Gard's TOP-TEN quality lines, and be sure you're getting the right glove for a specific job. No guess-work! Simply consult the convenient Selection Chart in your Wil-Gard Catalog. Then, give your Wil-Gard distributor a call. If you don't have the latest Wil-Gard Catalog, write for your free copy today.

Sold only through distributors!

WR-360-60

PROTECTION FOR THE HANDS OF INDUSTRY • SINCE 1916

WIL-GARD®

THE WILSON RUBBER COMPANY INDUSTRIAL DIVISION CANTON 6, OHIO
A Division of Becton, Dickinson and Company • Pacific Coast Warehouse: 530 Howard St., San Francisco 5, California

Items of personal protection worn on the job formed part of the display in a community safety drive. (Weirton Steel Co.)

Clothing for Work

Garments for every job and every part of the body

WORK CLOTHING may be defined as "any apparel suitable to work in." It includes dungarees, coveralls, overalls, work shirts and work pants of any type. Generally these garments are designed for more severe service than those intended for casual or dress wear.

Safety (protective) clothing is defined in terms of specific hazards. These garments are designed for some particular use and made of fabric to resist exposures like heat or acids.

Clothing for any occupation should meet these requirements:

1. Adequate protection for the job exposure.
2. Comfort and freedom of movement.
3. Durability.
4. Appearance.

Good design and fitting are essential in all work garments. Long, loose sleeves may get caught in machinery. Trouser cuffs may cause tripping.

Good styling has a particular appeal to women, but men like it too. Clean clothing is an aid to morale as well as to health and safety. Garments soaked in oil or flammable solvent ignite easily. Organic solvents, flammable or nonflammable, may cause skin irritation.

Specifications established by the federal government for civil and military operations are available to private industry. During World War II a series of war standards was put into effect, but these have not been revised to include developments in this field. Many large companies have established their own specifications for various items of work clothing.

Products of the leading manufacturers meet high standards of workmanship, materials, and protection for specified hazards. Their representatives can be extremely helpful in selecting equipment and planning programs. It is usually advisable to deal with more than one supplier.

Job Exposures

Safety clothing. Exposures requiring the use of special garments include:

1. Heat—Molten metal splashes, sparks, fighting fires, radiant heat.
2. Corrosive materials, solvents.
3. Low temperatures.
4. Flying objects.
5. Cuts, abrasions, and bruises from sharp or rough edges.

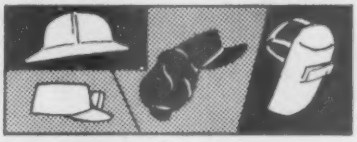
Heavy-Duty Clothes

Cotton and wool are the traditional materials for work clothes. In recent years a variety of synthetic fibers has been added to the available materials. Many of these excel the natural materials for certain uses. *—To page 142*

A well-kept, well-stocked safety store gives prestige to the program.

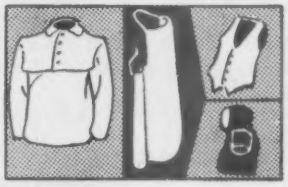
Pick Your Outfit

There's a garment for every job



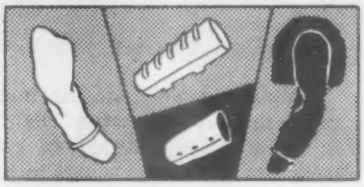
HATS, CAPS HELMETS

	1 Sparks	2 Hot Materials	3 Heat	4 Hot Liquids	5 Moisture	6 Acids & Alkalis	7 Slips & Falls	8 Falling Objects	9 Flying Particles	10 Electric Shock	11 Cuts & Abrasions	12 Dermatitis	13 Explosives	14 Machinery
Asbestos	X	X	X											
Plastic-Rubber				X	X	X				X		X		
Cotton-Wool	X		X									X		X
Metal								X	X		X			
Plastic	X							X	X	X	X			



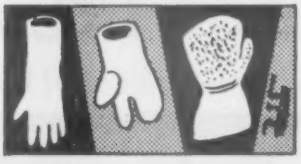
COATS, APRONS WAIST PROTECTION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Asbestos	X	X	X											
Chrome Leather	X	X		X					X		X			
Plastic				X	X	X				X		X		X
Rubber				X	X	X				X		X		X
Canvas-Fiber									X		X			X
Chemical Resistant						X								
Reflective Fabric				X										



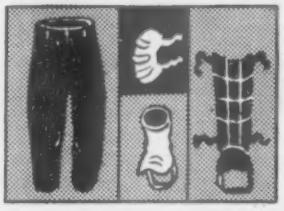
SLEEVES WRISTLETS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Asbestos	X	X	X											
Chrome Leather	X	X		X					X		X			
Plamoproofed Duck	X	X	X						X					X
Plastic				X	X	X						X		
Rubber				X	X	X				X		X		
Chemical Resistant						X								
Reflective Fabric				X										



GLOVES, MITTENS HAND PADS FINGER GUARDS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Asbestos	X	X	X											
Chrome Leather	X	X		X					X		X			
Rubber				X	X	X				X		X		
Plastic-Rubber Coated Fabric				X	X	X						X		
Metal Mesh											X			
Cotton-Canvas											X			



PANTS, KNEE PADS LEGGINGS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Asbestos	X	X	X											
Chrome Leather	X	X		X					X		X			
Plamoproofed Duck	X	X	X						X					X
Fiber-Metal	X							X	X		X			X
Plastic				X	X	X						X		
Rubber				X	X	X				X		X		
Chemical Resistant						X								
Reflective Fabric				X										

SHOES, BOOTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Steel Toe Caps								X			X			X
Non-Skid Soles					X		X							
Wooden Soles		X	X	X	X	X	X				X			
Chrome Leather	X	X	X	X										
Rubber				X	X	X				X		X		
Conductive Rubber													X	

Shoe store on rails. This converted coach carries foot protection to employees at many points along the Milwaukee Road.

Foot Protection

Steel toe caps and foot guards ward off heavy blows

SAFETY SHOES for industrial use may be classified in five general categories according to construction and intended use:

1. Steel box toe (general use).
2. Conductive.
3. Explosives operations (non-sparking).
4. Electrical hazard (shock-resisting.)
5. Foundry.

Special style for men and women are provided in classes 1, 2, and 3.

As generally used, the term "safety shoe" means a shoe with a reinforced toe. Steel toe boxes are specified for most occupations because of their ability to resist heavy blows.

Wearing of safety shoes for all jobs is encouraged by many companies and subsidy programs have been helpful in promoting foot protection.

Off the job, safety shoes are desirable in farming, in home workshops and while operating power or lawn mowers.

Safety shoes are now available in a great variety of types for occupational needs. Soles and heels may be obtained in leather and in combinations of rubber or neoprene with cord and cork.

Leather for both soles and uppers can be obtained in grades resistant to moisture and some chemicals. Compounds for preserving and waterproofing leather are available.

Standards

American War Standard, Z41 Series, American Standards Association, are still useful guides for purchasers of safety shoes.

Specifications call for a well-constructed, durable work shoe with a toe reinforced by a steel box. The box is supported on a flange resting on the sole. It must support a static load of 2,500 lbs. and resist the impact of a 50-lb. weight dropped 1 foot.

When subjected to either test, the inside of the toe box must not come closer than ½ inch from the upper surface of the sole.

Strength requirements for shoes for both men and women are identical.

Distribution

To secure acceptance of foot protection, safety shoes must be comfortable and properly fitted. Purchasing must also be made convenient.

Many large companies maintain well equipped stores with a wide range of lasts and sizes and trained attendants to fit the shoes. Shoes are sold at cost on the payroll deduction plan. Safety shoes are sometimes awarded as contest prizes.

Smaller plants are not always in a position to stock an adequate range of sizes or provide expert fitting service. Many companies make arrangements with local dealers whereby employees may purchase shoes through payroll deduction.

A mobile shoe service is offered by dealers in some areas. A truck equipped as a shoe store is manned by an experienced fitter who is responsible for all adjustments. A variety of styles and full range of sizes are carried. Periodic visits are arranged and between visits shoes

FOOTWEAR FOR VARIOUS EXPOSURES

Type of Footwear	Exposure
1. Conductive	Moisture: 8, 9
2. Nonsparking	Standing in water: 8, 9
3. Foundry shoes	Chemicals: 4, 8, 9
4. Wooden sole	Oil and grease: 4, 9
5. Insulated	Electric current: 5, 8, 9
6. Felt pac	Cinders: 4, 10
7. Linemen's boots	Hot surfaces: 4
8. Rubber boots, overshoes	Molten metal: 3
9. Neoprene boots, overshoes	Sharp and abrasive surfaces: 4, 12
10. Asbestos overshoes	Cold, snow, ice: 6
11. Shower sandals	Explosion hazards: 1
12. Steel innersoles	Slippery surfaces: 13
13. Slip-resistant soles and heels (Cord and cork)	Skin infections, athletes foot: 4, 11
14. Footguards	Handling extra heavy objects: 14

can be obtained quickly on special order.

This service is rendered on a moderate mark-up basis and the plant can charge the employee any part of the cost.

A worker should have more than one pair of safety shoes so they can be rotated. Shoes will last longer and be easier on the feet. The wearer will also have a pair available while the other is being repaired.

Records for each employee should be kept. A 3 x 5 in. card shows name, department, payroll number, and details of each transaction. These include date, stock number, size, width, price, and payment. The reverse side of the card carries such information as history, details of any foot trouble, and other comments.

Types of Shoes

Safety shoes, generally, are well made on lasts designed for comfort. They are available in many types and styles, some suitable for street wear. The protective toe box does not add appreciably to the weight or cost of the shoe.

Instep protectors available on some types of safety shoes provide increased foot safety. (DuPont)

General purpose shoe. The most widely used type is the blucher oxford. It is available in a wide range of sizes, widths and lasts, ranging from rugged, heavy-duty styles to those suitable for street wear. It is the basic type, with certain differences in detail for special occupations.

Low cut shoes (oxfords) are satisfactory for many occupations. Where the ankle is exposed to sparks or molten metal or chemical splashes there should be no gap between the shoe top and the trousers. High shoes, spats or leggings should be worn.

Foundry shoes. An early type of safety shoe still in use is the foundry shoe with elastic panels at the sides. There is no opening on the instep where molten metal or hot sand can penetrate and the shoe can be pulled off quickly in an emergency. This model is furnished with steel box toe.

Spark-proof shoes. Shoes with brass hooks and eyelets and brass nailed heels are worn in some industries where sparks from iron or steel might ignite flammable gases.

Shock-resisting shoes, designed for work around electric equipment, have no metal parts except insulated

Specialized Suits

FOR FAST, SURE FIGHTING OF MAJOR CHEMICAL DISASTERS

When chemicals flow unchecked from a line break . . . and dangerous fumes fill the air . . . then, at that precise moment, you must have highly chemical resistant, complete enclosure emergency garments on hand that workers can wear safely into a dangerous area.

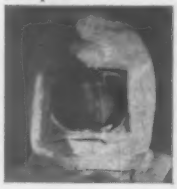
The StaSafe Acidmaster (for use with various types of self-contained breathing apparatus) and the StaSafe Emergency Suit (with airline) are those types of garments. Both are made of StaSafe Gra-Lite-20 fabric . . . a lightweight garment material resistant to an extraordinarily wide range of chemicals. Gra-Lite has excellent abrasion resistance, will not support combustion and remains flexible under wide variations in temperature. Gas-tight, as well as liquid-tight, features are available.

Both the Acidmaster and the Emergency Suit have many unique features that aid emergency crews in finding and repairing causes of chemical escape. Write today for full information on both garments.

StaSafe Acidmaster

Rear of StaSafe Emergency Suit showing air line and life line.

Front view of Emergency Suit model designed for Scottoramic face piece.



STANDARD SAFETY EQUIPMENT COMPANY

403 NORTH QUENTIN ROAD • PALATINE, ILLINOIS

604 BROADWAY, NEWARK 4, N.J. | 12921 W. WASHINGTON BLVD., LOS ANGELES 66, CALIF. | 855 EAST 152nd STREET, CLEVELAND 10, OHIO

America's top corporations keep right on proving . . .*

The safest work gloves always cost the least

Whether plant safety is your main job or one of your secondary responsibilities, you know from experience that there's no substitute for top quality protective equipment. The only problem is deciding which products *are* the very best on the market.

When it comes to hand protection, more and more companies are solving this problem the sensible, scientific way.

They're accepting Edmont's standing invitation to make their own on-the-job comparison tests. And after analyzing the results, they are specifying Edmont work gloves for more and more types of industrial operations. For example:

Case No. 632: *Handling thin, sharp-edged steel sheets, an Edmont recommended glove gave 4 times longer protection than the costly leather gloves previously used . . . cut glove costs 73%.*

Case No. 642: *Unloading rough lumber, an Edmont recommended glove gave over 2½ times longer protection than the leather palm gloves previously used . . . cut glove costs 51%.*

Case No. 663: *Handling hot solder bars, an Edmont recommended glove gave 2 times longer protection than the leather palm gloves previously used . . . cut glove costs 51%.*

These three cases are typical of thousands which prove that modern Edmont coated work gloves not only protect longer, but also cost less, especially since the recent price rises of leather and cotton gloves.

Edmont's "Grab-it" glove, used in the above tests, is *Extra*coated with rough-finished natural rubber, which makes it the safest general handling glove. It cushions hands against shocks and vibrations, has excellent resistance to cuts, snags, abrasion and heat, and is unequalled for positive non-slip grip, wet or dry.

FREE TEST OFFER TO LISTED FIRMS: We make many types of natural rubber, plastic, and neoprene coated gloves to fit different job requirements. Tell us your operation, materials handled, temperature condition. We will recommend correct glove and send samples for on-the-job testing. Write Edmont Manufacturing Company, 1205 Walnut Street, Coshocton, Ohio. In Canada, write MSA, Toronto.

**Company names and full details on request.*

Edmont

JOB-FITTED GLOVES

Circle Item No. 82—Reader Service Card

steel box toes. They are also worn by those handling flammable materials, by workers in explosives plants, and in grain products refining operations.

Where it is felt that impact resistance must be compromised with the need for insulation, toe boxes of fiber or plastic are sometimes used. Such shoes, however, are not classed as "safety" shoes.

Conductive shoes are designed to drain off static charges to prevent their building up in the body to the point where they could cause a spark.

The conductivity of these shoes is affected by other conditions. Wool, natural silk, and nylon socks act as insulators to the body; cotton, lisle or rayon are satisfactory. Foot powder also serves as an insulator.

The floor as well as the shoes must be conductive.

Insulated shoes. Where feet are exposed to extremes of heat or cold, shoes with heavy insulation give needed protection.

Instep protectors. Some models have tough, shock-absorbing guards over the instep. These provide added protection without hampering movement of the feet.

Toe clips. Where men will not or cannot wear safety shoes, steel clips nailed to the shoes or attached with spring clips can be provided. These are sometimes used by temporary crews but are not substitutes for safety shoes.

Rubber footwear. Where work must be done in deep mud or in water, rubber boots contribute to health, comfort, and safety. Rubber boots are available with steel box toes.

Soles and Heels

Slip-resistant soles and heels are good for general use since slipping hazards are frequently found where they are not expected. No type of footwear, however, is a substitute for good housekeeping. Even nonslip soles and heels cannot provide a sure footing where there are heavy accumulations of oil, grease, and other slippery materials.

Leather is comfortable and durable for normal conditions. Leather does not give satisfactory service where heat is excessive or where the shoe is subjected to constant dampness.

Workers who handle heavy castings need the extra protection of foot guards.

FOR SAFETY • COMFORT • FULL PROTECTION
TOP NOTCH
INDUSTRIAL CLOTHING
AND
FOOTWEAR

OILTIGHT WORK SUITS

A superior quality all-around work suit made of strong durable sheeting, with a light coating of Neoprene compound on the inside to protect the fabric, a heavier Neoprene coating on the outside. Fly front with rustproof hardware, corduroy tipped collar.

Overalls feature a bib front, adjustable webbing suspenders, waist tie cords for side adjustment, cut-off band on overalls permits shortening without frayed edges developing.

Jacket and Overalls may be purchased separately as well as in combination.

WORKIN

Black all rubber work shoe, 6" height, blucher pattern, DURATEST cleat design outsole and heel, net lined, available with or without Steel Toe feature.

Write for free information and illustrative material on other styles of Top Notch Industrial Clothing and Footwear.

TOP NOTCH

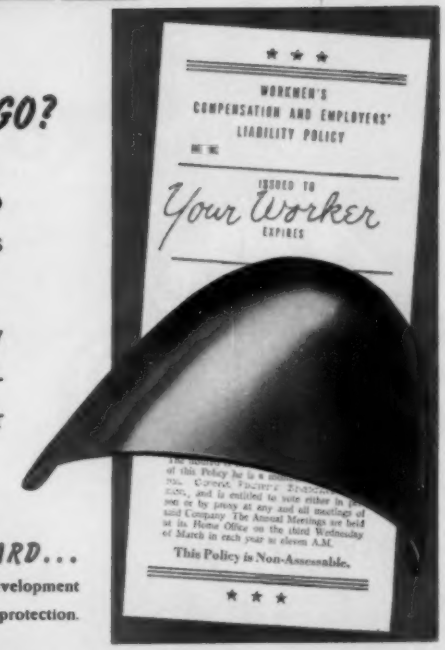
PRODUCTS OF
BEACON FALLS RUBBER FOOTWEAR
BEACON FALLS, CONN.

ONE WORKER DOWN AND ...219,999 TO GO?

Reliable insurance sources state that according to latest available figures 220,000 industrial foot injuries occurred in a single year.

Here is positive proof that *regular* shoes are not only costing industry millions of dollars in lost-time injuries each year, but untold human suffering to their workers as well.

Ridiculous . . . when you consider that safety shoes purchased through industry cost less than ordinary shoes and would have prevented most of these unfortunate accidents.



WINGUARD...
The latest development in steel toe protection.

Safety Box Toe Company

812 STATLER BUILDING · BOSTON

Rubber is resistant to moisture, alkalis, and most acids. It deteriorates quickly when exposed to grease, oil, solvents, some acids, or excessive heat.

Neoprene resists moisture, also grease, oil, and solvents that would ruin rubber. It stands up well against cutting and abrasion.

Cord incorporated in rubber or neoprene, similar in construction to automobile tires, gives good traction and wear under severe conditions.

Cork blended with rubber or neoprene provides good slip resistance and the soles are light and flexible. Cork also helps to insulate feet against heat or cold.

Wood soles are used for extreme conditions of heat, dampness, oil, acids, or caustics underfoot. They are worn in steel mills, foundries, for handling asphalt and other hot operations. They also afford protection against nails, broken glass, scrap metal, and other sharp objects.

A print of the foot insures correctly fitted shoes. (General Motors)

Wooden-soled shoes can be obtained with steel toe boxes or with guards which cover toes and insteps.

Foot Guards

Where unusually heavy objects are handled, feet may need more protection than shoes with reinforced toes. For such work, there are foot guards of heavy-gauge, flanged, and corrugated metal.

The guards are strapped on over the shoes and protect the instep as well as the toes.

With the flange resting on a firm floor surface, foot guards should stand an impact of at least 300 foot-pounds without being dented sufficiently to damage the shoe underneath or injure the foot.

Foot guards are also made with soles of rubber or calked steel to minimize slipping hazards.

Combination shin-foot guards, with an aluminum alloy shin protector hinged to the foot guard, are available. * * *

FASHION SEAL

presents a complete line of Lint Free

ACID RESISTANT INDUSTRIAL UNIFORMS

tailored of 100% Dupont Dacron®

CHECK THESE SAFETY FEATURES

- ✓ Resists deterioration by acids and chemical fumes.
- ✓ Lint free.
- ✓ Non-allergic.
- ✓ Resists dirt, grease, mildew, abrasion, micro-organisms.
- ✓ Non-combustible.
- ✓ Non-static finish.

Plus the additional advantages of washing ease, quick drying, lightweight, comfort, durability!

LABORATORY REPORT PROVES ACID RESISTANCE

Fashion Seal's Dacron® was put through a series of actual immersion tests in the following chemicals under varying temperatures and durations... with little or no loss of fabric strength! Sulfuric acid, aqua regia, hydrochloric acid, chromic acid, phosphoric acid, nitric acid, acetic acid, hydrofluoric acid, sodium hydroxide, acetone and hydrogen peroxide.

FASHION SEAL will gladly send you a copy of this report if you desire it.

ALL FASHION SEAL DACRON® UNIFORMS ARE SEWN WITH DACRON® THREAD TO ASSURE DURABILITY AND STRENGTH.

Write for illustrated catalog of complete industrial uniform lines

"He belongs to our safety manager."

GLO-GLUVS*

*Trade Mark

MOST REVOLUTIONARY ADVANCEMENT IN INDUSTRIAL WORK GLOVES...EVER!

Here's the "Golden Gloves" all-industry champion of coated work gloves . . . available only from Granet. Watch for the Granet Glo-Gluv in more and more applications where worker safety and "spot" identification are imperative.

The GLO-GLUV, manufactured under the precise standards you've come to expect from Granet, equips your workers with the most functional, fashionable coated work glove, anywhere.

Ask for Granet GLO-GLUVS at your nearest distributors or write on your letterhead for your free sample pair now.

THE *GRANET* CORPORATION, 23 LORING DRIVE, FRAMINGHAM, MASS.

Hands and Arms

Protection for vital working parts

FINGERS, hands, and arms are involved in approximately one-third of all reported occupational injuries, in addition to a large number of unreported first aid cases.

The hands, so essential in performing every type of work, are exposed to cuts, scratches, burns, and bruises in the course of a day's work.

Finger movement is necessary for practically all jobs, which makes protection more difficult than for most other parts of the body. For the forearm, semi-rigid protectors are often practicable.

Types of protection available in a wide variety of styles and materials include:

1. Gloves
2. Mittens
3. Hand pads
4. Arm protectors
5. Sleeves
6. Finger guards
7. Protective creams

Generally, gloves, mittens, or hand pads should not be worn around revolving machinery. An exception is buffing and polishing on high-speed lathes where parts become too hot to handle with bare hands.

Ordinary cotton work gloves offer some protection on light jobs but many operations require more durable material in a variety of specialized designs.

Common materials are used:

Canvas is relatively low in price and suitable for light work. It is washable. Canvas gloves are made in several weights and grades and in sizes for men and women.

Duck and **terry cloth** are used for handling objects which are not too rough, sharp, or hot.

"Hot mill" gloves are made from a heavy twisted weave fabric which also gives good service for handling rough objects.

Leather is more durable for most industrial uses. It offers greater protection against cuts and abrasions. Clean leather or leather-faced gloves give a firmer grip on smooth metal objects than do cotton or other types.

Chrome leather is used where there is exposure to sparks or molten metal. However, no material of animal or vegetable origin will stand continued excessive heat.

Asbestos is used where hands must be protected against extreme heat, as in steel mills, heat treating plants, welding, galvanizing, and glass manufacturing.

Asbestos gloves may be obtained unlined or with lining of flame-proof fabric or wool. Lining is desirable for comfort and added protection against heat. It also keeps the hand from rubbing against rough inside seams, which unravel from movement of the hand.

Heat-repelling mittens of aluminum-coated fabric between two layers of asbestos, jersey lined, offer unusual protection against heat. These mittens are reversible.

Rubber, neoprene, and **vinyl** films are suitable for chemical laboratories and plants where acids and other corrosives are handled.

Neoprene and vinyl are particularly useful where petroleum products and organic solvents are handled. Plastics vary in their resistance to chemicals and the manufacturer should be consulted about exposures.

Fabrics coated with rubber, neoprene or vinyl are used for light cleaning operations. They offer greater protection against abrasion than uncoated fabric.

When rubber or plastic gloves are worn for long periods, a lightweight fabric liner is desirable. If no liner is available, talcum powder should be shaken into the gloves before wearing.

Rubber, plastic, and asbestos gloves should extend well above the wrists. Gauntlets should have locking devices to assure a snug fit about the wrists. Sleeves should be kept rolled down, leaving no skin exposed.

Metal mesh gloves are used in meat and other cutting. They should fit snugly.

Metal staples in gloves, mittens, and hand leathers give increased protection when handling sharp or rough objects. Metal-studded gloves should not be worn around electric apparatus.

Lead-rubber gloves protect the hands against X-rays and the gamma rays of radioactive materials. They are worn by medical, industrial, and nuclear technicians. The glove may include a leather outer covering to prevent damage to the lead-impregnated rubber.

Lead-leather gloves are also worn for radiation exposures.

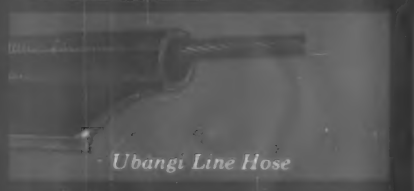
—To page 164

Many types of gloves are needed in industrial operations. In the above display are 12 types. Materials are: canvas, leather, asbestos, rubber, neoprene and canvas.

PROTECT LINEMEN WITH SALISBURY UBANGI SYSTEM!

NEW one-man application with hot line sticks

New! One-man applicator for Ubangi Line Hose, Connectors, Hoods and Blankets. Fits all universal sticks. Adjusts to any working angle.



Ubangi Line Hose

Ubangi Insulator Hood

Line Hose Connector

Ubangi System is Flexible... Economical
Non-Breakable...
Easily Stored... Corona Resistant

The trend toward higher distribution voltages creates a demand for special protective equipment to provide linemen temporary insulation against contact with energized circuits. Salisbury's Ubangi System, of new Salcor compound with Hypalon synthetic rubber, provides the dielectric strength, corona resistance and flexibility to meet this need. Lock Lap lips prevent accidental dislodgement of line hose. Rip-Grip construction securely fastens hose to insulator hoods and connectors. New applicator permits one-man installation of hose, connectors, hoods and corona-resisting blankets.

Write for descriptive literature and test values.

THE WORLD'S LARGEST MANUFACTURER OF LINEMEN'S RUBBER PROTECTIVE EQUIPMENT

W. H. SALISBURY & CO.

401 N. Morgan Street • Chicago 22, Illinois

The OUNCE* that COUNTS

H306 . . . Walnut leather and Nylon mesh; oak leather sole; rubber heel.

H545 . . . Black calf "Executive"; completely leather lined; oak leather sole; rubber heel.

NEW ADDED TO THE HY-TEST LINE

H546 . . . Grey buc treated with "Scotchgard" Leather Protector; Resist-Oil Cellular Crepe Grit sole and heel.

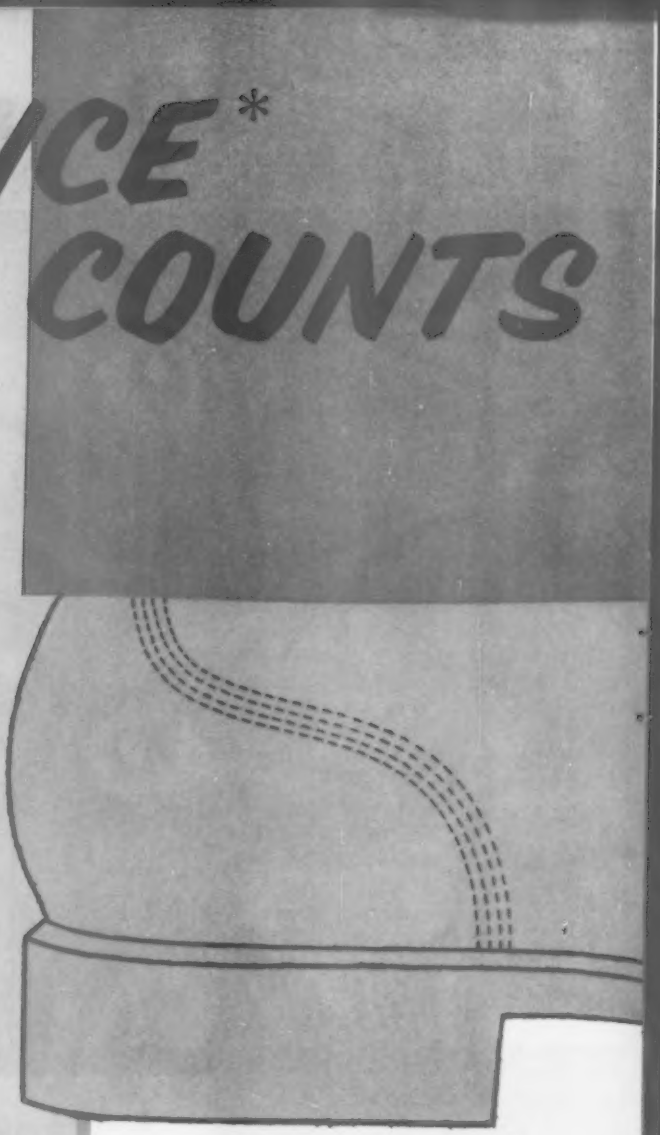
H549 . . . Dark brown calf "Executive"; completely leather lined; oak leather sole; rubber heel.

H550 . . . Antiqued brown leather ventilator; completely leather lined; Resist-Oil sole and heel.

H948 . . . Black Quilon-treated upper; Chip-Chek Grit oil-resistant sole and heel.

H551 . . . Walnut Grain upper; Neoprene Air Cushion Saf-Tred Crepe sole and heel.

H552 . . . Black leather ventilator; completely leather lined; Resist-Oil sole and heel.



* **ANCHOR FLANGE®**
Austempered
Steel Box Toe

Exclusive in HY-TEST SAFEty SHOES, this patented "Arch of Steel" with its flanged construction serves as a foundation to provide added strength under impact or compression. It prevents tilting or shifting when subjected to pressure or a heavy blow. Give your workers this proved Ounce of Prevention.

HY-TEST SAFEty SHOES

Division

INTERNATIONAL

SHOE COMPANY

1509 Washington Ave., St. Louis 66, Mo.

TELETYPE: SL186

927 N. 3rd St., Philadelphia 23, Pa.

TELETYPE: PH476

Insist on Comfort-Fitted . . . . .

HY-TEST INTERNATIONAL SHOE COMPANY SAFETY SHOES

HY-TEST

SAFEty SHOES FOR EVERY NEED

Clothing for Work

—*From page 129*

Cotton is available in a variety of weights and weaves. Most useful of these is duck. It can be flameproofed or made water resistant. It is used as a backing for rubber, neoprene, or plastic films. It is aluminized for garments used for protection against radiated heat.

Modern flameproofing methods have made cotton fabrics suitable for many occupations which formerly required heavier garments of chrome leather or asbestos.

Wool offers excellent protection against heat and cold. It is used for lining asbestos garments. It is resistant to sparks and molten metal splashes and will not support flame.

Synthetic fabrics are resistant to rot, mildew, insects, sunlight, moisture, and a wide range of chemicals. Most of these fibers will char when exposed to flame but are either slow-burning or will not support combustion. Synthetic materials vary widely in their characteristics, and the manufacturer should be consulted about specific exposures.

For work clothes the most widely used are the acrylic fibers. Dynel and Orlon. Among the largest users of these materials are chemical plants, where daily contact with acids and caustic solutions causes rapid deterioration of organic fibers.

A problem in many industries is to find materials that will stand the vigorous laundering needed to remove grime and chemical and the wear and tear while being worn. Here synthetic fabrics have proved their value.

Atomic energy installations make severe demands on work garments which must be washed frequently in strong decontamination chemicals. Acrylic fibers have shown exceptional endurance to this treatment.

Water repellency and spot and stain resistance can be increased by a silicone finish. This reduces the amount of cleaning needed.

Safely dressed for many jobs with garments of long-wearing, acid-resisting synthetic fabric, gauntlets, hard hat, and goggles. (DuPont)

Anti-static finish. In the past, synthetic fibers have been barred from locations where static electricity is a hazard. A recently developed

INDUSTRIALLY
SAFETY is . . . as MILLER does
MILLER . . . FIRST IN SAFETY . . . FIRST IN PROGRESS

No. 2N Body Belt, available with either friction or tongue buckle.

No. 102D Harness Safety Belt with exclusive MILLER offset friction buckle. Also available with tongue buckle (102DA).

No. 6001 Harness for tanks, chimneys or any upright raising or lowering.

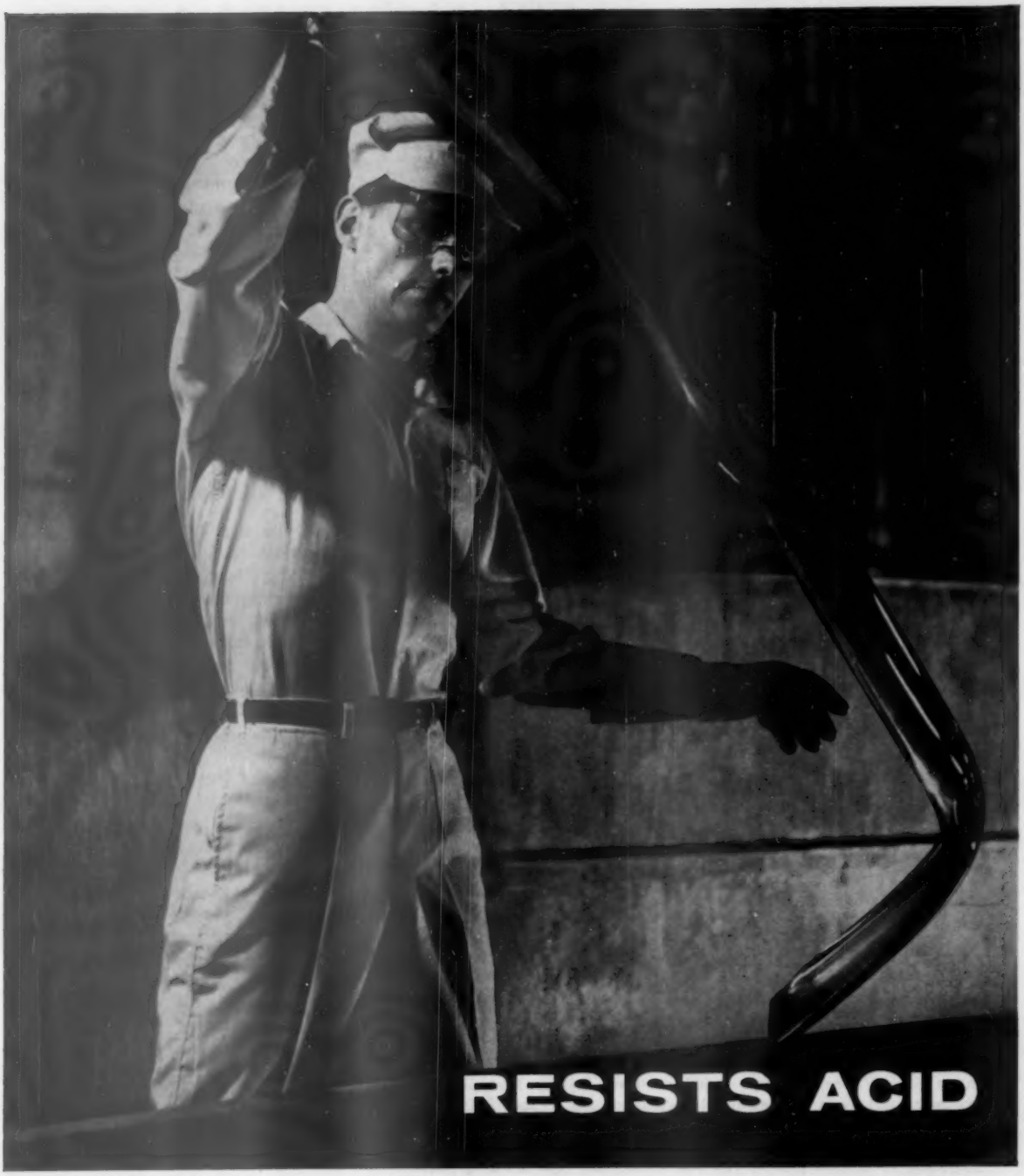
No. 124 Industrial Safety Belt with tongue buckle, perfect fitting and comfortable.

In Industry, as it is with Power and Utility Companies, safety conscious people continue to become more demanding. MILLER is often called upon to study job hazards and asked to recommend or develop certain safety equipment. Remember, when it concerns safety, Industrially . . . Safety is—as MILLER does! *Write for specific safety literature or complete catalog.*

DON'T RISK IT . . . MILLER IT!

Miller EQUIPMENT CO., INC.
FRANKLIN PENNA

IN CANADA: SAFETY SUPPLY CO., TORONTO



"Dacron" gives extra strength, neat good looks to uniforms!

Uniforms made with "Dacron"* polyester fiber have multiple advantages in every type of industrial manufacturing. They have superior resistance to acids and chemical corrosives. Their tensile strength, tear resistance, sturdy construction give them longer life, which means substantial savings on replacement costs. And they keep their neat look, hold a press! Ask about them today.

Du Pont's registered trademark. Du Pont makes fibers, not the fabric or uniform shown.

DACRON®
POLYESTER FIBER

DU PONT
REG. U. S. PAT. OFF.

Better Things for Better Living . . . through Chemistry

WORKLON tailors uniform shown of 100% "Dacron" polyester fiber

process has made it possible to make Dynel highly conductive. This process is said to withstand repeated launderings. With some other fibers, treatment with an anti-static agent in each laundering will minimize the static hazard.

The finish repels dust and lint and is said to be easy to decontaminate after radioactive exposure.

Impervious materials of many types provide protection against dust, vapors, moisture, and corrosive liquids. They are useful in handling materials which would cause burns or dermatitis. This type of material includes rubber, neoprene, and vinyl films and fabrics coated with them.

Rubber resists acids, caustics, and other corrosive substances, as well as moisture. Garments of rubberized fabrics are used when handling low concentrations of acids and non-caustic liquids and for protection against weather. High dielectric strength makes it useful where electricity is used.

Neoprene, a synthetic rubber with many useful qualities, is widely used in safety equipment. It forms a tough durable film resistant to acids, solvents, and alkalis. It has high dielectric strength.

Vinyl plastic is resistant to moisture and a wide range of chemicals. It can be rolled or calendered onto fabric, or it can be used as a strong, pliable film without backing.

Water-repellent duck combines strength and durability with light weight. It is used in exposure to moisture and non-corrosive liquids.

For Hot Jobs

Fire-resisting garments include aprons, coats, coveralls, pants, hoods, leggings, spats, sleeves, gloves, mittens, and hand pads.

Materials commonly used are flameproofed duck, chrome leather, asbestos, and aluminized fabrics—asbestos, glass fiber, and duck.

Flameproofed fabrics. No fabric suitable for clothing can be made "fireproof," but these treated materials will not support combustion. They have proved practical for many operations, such as welding and foundry work.

Flameproofed garments are obtainable in most items used in industry. Some types of treatment will stand repeated launderings. Other compounds used in industrial and commercial laundries can be applied after laundering.

Flameproofed garments should be plainly marked, so untreated clothing will not be used by mistake.

Modern flameproofing methods have made cotton fabrics suitable for many occupations which formerly required heavier garments of chrome leather or asbestos. However, flameproofed cotton should not be used for the more severe exposures.

Chrome leather is designed for rough use, such as sandblasting and for protection from hot sparks and molten metal in arc welding. Metal sparks do not adhere readily to chrome leather. It is the most dur-

—*To page 148*

Look twice...it's a safety shoe

Handsome, sure! But good looks are only part of the story of this popular Knapp Safety Shoe. Beneath its modern dress styling, Knapp builds in maximum protection and unequalled comfort. All Knapp Safety Shoes feature Austempered Steel Toe Boxes that meet the testing requirements of American Standards Association. Tops in comfort, too. Knapp Air Cushioned Innersoles provide foot-fresh efficiency through long hours of wear. Any way you look at it — for style, comfort, safety — it makes good sense to insist on Knapp Saf-Test Shoes!

FOR FULL INFORMATION, WRITE SAF-TEST DEPT.
KNAPP BROS. SHOE MFG. CORP., BROCKTON 61, MASS.

KNAPP SAF-TEST
Aerotred Cushioned
STEEL-TOE SAFETY SHOES

HIGH VISIBILITY "U.S." YELLOW FOR SAFETY

scientifically engineered protective clothing for all industry

ML816
ML252
Steel-toe lace workshoe. Terre Haute mining boot. Both with safety-yellow toe caps.
MB801
US ROYAL
Steel-toe short boot with safety-yellow toe cap.
High-tensile steel toe construction withstands up to 2000 lbs. without buckling; bears up under 150 lbs. of dead-weight drop.
STEEL TOES FOR SAFETY
CUSHIONED INSOLES FOR COMFORT
U.S. FIBERTHIN COVERS BEST
MRC 217
Safety-yellow Brunswick general-purpose coat of nylon U. S. Fiberthin.
MRJ 797
Safety-yellow Peerless jacket and overalls of "U. S."-treated Neoprene.

Two labels to look for when you're in the market for high-visibility safety with practical comfort and longer wear. 1. *U. S. Tempered Rubber*, the specially toughened rubber formulation that gives "U. S." safety-toe shoes and boots at least ⅓ longer wear. 2. *U. S. Industrial Raynsters®* in Fiberthin® or Neoprene. Where lightweight durability is a consideration you'll probably wish to specify U. S. Fiberthin, the new protective material with twice the strength and half the weight of the best conventional material. And for top value in meeting protective problems involving acids, oils, chemicals, you'll want to look into "U. S." special way of treating fabric, outside and inside for maximum protection, with Neoprene. Call your jobber for information on these and other great U. S. Rubber products, safety-engineered in our research laboratories to meet the special requirements of all types of industrial and public service work.

United States Rubber

Rockefeller Center, New York 20, N. Y.

safety looks good on the foot . . . . . .

LEHIGH users find it relatively easy to convert even the diehard holdouts to safety shoes that look as good as this. They cost your men dollars less than equivalent quality in ordinary street shoes. They wear longer than ordinary shoes. And they include the provable ledger value of efficient toe protection. *You control* your foot-safety program with Lehigh. If you don't have such a program it is probably costing you more than your management may realize. Be a hero. Check up.

BOOTH #16

GREATER NEW YORK SAFETY CONFERENCE

LEHIGH SAFETY SHOE

. . . . . and even better on your company's financial statement

● ***Here are some facts that may open your eyes:***

(approx.) 3,500,000 pairs of safety shoes sold annually
.03 (Foot and toe injury avoidance rate as established by national survey)

105,000 FEET AND TOES SAVED ANNUALLY BY SAFETY SHOES (all makes)

$256. average company cost-per-toe and foot injury (National Safety Council)

$26,880,000. TOTAL ANNUAL SAVINGS TO INDUSTRY ON FOOT AND TOE INJURIES PREVENTED OR MINIMIZED BY SAFETY SHOES!

FIGURE IT OUT in terms of your own compensation premiums. Then decide if your company can afford to go another year without a comprehensive Foot Safety Campaign.

CLIP AND MAIL THIS COUPON FOR THE **LEHIGH SERVICE STORY**

LEHIGH Safety Shoe Co., Emmaus, Pa.
Please send at once without cost or obligation

- ☐ Display poster of 71 safety shoe styles
- ☐ Complete Lehigh catalog
- ☐ Fit Kit of 101 ideas to help you promote foot safety in your plant

Name_____
Company_____
Title_____
Street Address_____
City_____ Zone____ State_____

COMPANY, Inc. • Emmaus, Pa.

Clothing for Work

—*From page 144*

able material for protective clothing, and the most expensive.

Asbestos, long used for protection against fire, is used for a variety of protective garments, ranging from hand pads to complete suits. It is particularly useful for gloves worn for handling hot objects.

Underwriters' grade of asbestos, rather than the commercial grade, should be used. Cloth used for garments and accessories contains 80 to 85 per cent asbestos and weighs about 2½ lbs. per square yard.

Aluminized fabrics owe their protective qualities to the thin aluminum coating that reflects 95 per cent of the radiant heat. This permits lighter and more flexible garments, allowing the wearer to work more freely and effectively. Underwriters' grade tropic weight asbestos can be used instead of the heavier material.

To provide oxygen for the wearer, self-contained breathing apparatus can be carried under the coat.

Aluminized garments are not recommended for exposure to direct or conducted heat. There is little heat dispersion, and the aluminum coating will melt under direct heat at high temperatures.

Aluminized garments designed for specific jobs are used in many industries, such as ceramic, metalworking, and petroleum, as well as for rescue work. These are available from several manufacturers and distributors.

Protection against impact. Most garments provide some protection against cuts, bruises, and abrasions. Aprons of padded leather, metal-studded leather, or metal mesh are worn to shield the abdomen and groin. Kickback aprons, worn by saw operators, have a fiber shield for protection against kickbacks.

Welder's clothing. Protective clothing is as much a part of the arc welder's outfit as his helmet. Ordinary cotton shirts and dungarees can be ignited quite easily. Garments of chrome leather or flameproofed duck may prevent serious burns.

Garments available include overalls, pants, chaps, aprons, jackets, sleeves, gloves, mittens, and spats.

Clothing should be of good quality material, solidly constructed. Fastenings must prevent gapping and should be so designed that the wearer can get out of the garment quickly.

There should be no turned-up cuffs or other projections to catch hot metal. Pockets should have flaps.

Laundry service. Laundered overalls, coveralls, aprons, smocks, and other garments are usually furnished by the employer where extreme cleanliness is required in plant processes or where toxic materials are handled. In many cities, industrial laundries provide a complete service.

For making you feel spruced up at minimum cost, nothing beats a new pair of shoelaces.

SEECLOTH

The largest companies in the country give their workers SEECLOTH for fogproofing goggles & windshields. WHY?

BECAUSE—

1. It is the most convenient and economical method known for fogproofing goggles or windshields. The cloth lasts for as long as a year if kept clean and dry.
2. It saves the worker's time. He doesn't have to go anywhere to do anything about his goggles—he has the means of fogproofing them right in his pocket.
3. If he fogproofs his goggles in the morning and after lunch, while his hands are clean, by wiping them with SEECLOTH, the goggles stay clear *all day long* and the cloth stays clean.
4. In truck fleets and bus fleets the larger pieces of SEECLOTH fogproof the windshield and prevent accidents. One fogproofing a week is usually sufficient to keep the windshield clear.
5. SEECLOTH is made in a variety of sizes, namely, 3″ x 8″ strips and also 8″ x 9″, 12″ x 18″ and 16″ x 18″ pieces individually packaged in polyethylene envelopes.

HYGIENE RESEARCH, Inc.

684 BROADWAY, NEW YORK 12, N.Y.

Samples on request. *Write Dept. NS-360*

"Visit Us At Booth No. 6 New York Show"

Even heaviest blows can't bruise toes in B.F.Goodrich rubber work shoes

WHEN an especially heavy weight falls on the steel safety toes of industrial shoes, there's a tendency for the steel to "give" under the blow, then spring back into shape. In an ordinary safety shoe, this causes the steel edge to gouge or pinch the toes. But the steel safety toes in B.F.Goodrich boots and rubber work shoes keeps toes unharmed. Reason: There's a greater clearance between toe and metal, and a protective sponge rubber lining that cushions the blow.

Worker's feet are not only safer, but feel better, too, in B.F.Goodrich boots and rubber work shoes. That's because B.F.Goodrich footwear is made on lasts which are based on 800,000 measurements. They "fit" as good as the worker's regular shoes. These are typical of the B.F.Goodrich improvements in footwear that save you money, help workers in their jobs and give them greater protection.

Shown above is the B.F.Goodrich rubber work shoe. The B.F.Goodrich line also includes several styles of boots made with neoprene for protection against acids, oils, fats, greases. For full information and a catalog, call your B.F.Goodrich distributor, or contact *B.F.Goodrich Industrial Footwear, Dept. N, Watertown 72, Mass.*

INDUSTRIAL FOOTWEAR BY B.F.Goodrich

Circle Item No. 95—Reader Service Card

Circle Item No. 96—Reader Service Card→

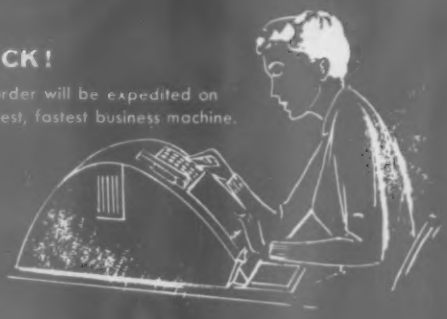
Speedy service you will appreciate

RUSH!

Airmail your orders to us, or better still, wire or phone.

QUICK!

Your order will be expedited on the latest, fastest business machine.

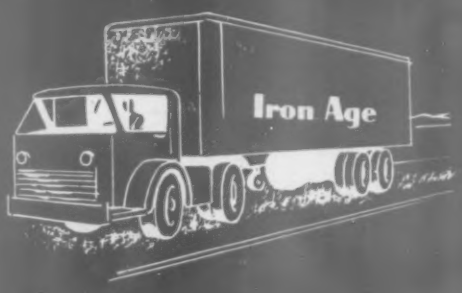


FAST!

Well-filled warehouse stocks will take care of your every safety shoe need.

HURRY!

Most orders are cartoned and on their way within 24 hours of receipt.



From the time your order for Iron Age safety shoes reaches our headquarters in Pittsburgh until it is rolling towards you, everything possible is done to expedite shipment.

We have installed a streamlined system for acknowledging, entering and following through on all orders, large or small. The latest in mechanized handling and cartoning speeds our superior quality safety shoes to you, when and as you need them.

All of us—our salesmen in the field and we at the plant—pledge a continuance of our policy that service to our customers comes first. That's another good reason why Iron Age has continued to gain increasing acceptance among safety supervisors everywhere.

No. 608—one of the more than 50 styles of Iron Age safety shoes.

Iron Age

The Safety Shoe For Industrial America

There's a world of service in this distinctive Iron Age value leader

No. 632

C 6-13 D 5-13
E 5-13 EEE 6-13

In safety shoes, service counts, especially when the quality and craftsmanship built into shoes with the Iron Age label benefit both you and your employees.

The stylish brown Quilon leather oxford, No. 632, pictured here is an outstanding example. It's eye-appealing, comfortable, long-wearing . . . just the steel toe safety shoe to attract your workers and increase your coverage. Ask for a showing.

No. 632 has a premium quality Goodyear Oil Proof Chemigum sole and heel. Chemigum represents the tops in resistance to the ravages of heavy industrial wear—wherever caustics, oil, grease or abrasives are present underfoot. For such conditions Chemigum soles and heels outlast others and offer their wearer greater, safer foot mileage.

GOODYEAR

OIL CHEMIGUM PROOF

SOLES AND HEELS

Iron Age SAFETY SHOES

Iron Age

1205 Madison Avenue, Pittsburgh 12, Pa.

Safety Belts and Harness

For routine or emergency use

SAFETY BELTS or harnesses with life lines are required:

1. For work at high levels.
2. In closed spaces where air may be irrespirable.
3. Where there is danger of being buried by slides of material.

Occupations in which safety belts are used routinely or occasionally include:

1. Structural steel and bridge workers.
2. Window cleaners.
3. Public utility linemen.
4. Forestry workers.
5. Cranemen.
6. Miners.
7. Mechanics.
8. Painters.
9. Workers entering tanks, bins, and underground passages.

In selecting equipment, consider two types of use—normal and emergency.

Normal use involves comparatively light stresses applied during regular work. These stresses rarely exceed the static weight of the wearer.

Emergency use means stopping a man when he falls. This may subject every part of the belt to an impact loading many times the weight of the wearer.

The probability of injury depends on the way the load is applied as well as on the total amount of the load. A person can stand a great deal more injury if the belt is tight enough to remain at the waist than if it is jerked up under the shoulders by the impact of a fall.

The life line should be long enough to permit freedom of movement, but the life line should be tied off as short as the job will permit.

Safety device for climbers on oil rigs and other high structures. Notched carrier is clamped to rungs of fixed ladder; sleeve on rail is fastened to belt. (Safety Tower Ladder Co.)

Types of Equipment

Types of belt and harness have been developed for various occupations. Examples of specialized equipment are the lineman's belt and safety strap and the window cleaner's belt.

These belts are built for extra severe use. Both belting material and hardware are the result of much research and experience in the field. Belts are usually serially numbered and dated so records of age and condition may be kept.

For many occupations a lighter belt will provide ample protection. These may be of the simple body type or the hardness type. Both types have a D to which a life line is attached. The harness type distributes the shock over the shoulders, back, and waist instead of concentrating it at the waist.

Materials. Belts of leather and cotton, nylon and dacron webbing are provided by most manufacturers.

Well-tanned and oiled leather resists most chemicals but it should not be left in contact with them. Regular cleaning after use is important.

Leather ¼-in. thick and 1½-in. wide will have an ultimate strength of about 500 lbs. This is adequate for lifting a man out of a tank or bin.

Webbing will stand more heat than leather and, after soaking in water, will dry out in its natural condition. Friction buckles can be

BE READY FOR ACTION!
WHEN FIRE STRIKES

CLOSED

The GARDWELL Fire Blanket Container is fast and easy to operate. Use it to smother fires or for first aid cases. Pull the release and the 66" x 84", 4 lb. woolen blanket slides out instantly. The container is painted a bright red and is designed for easy hanging. ASBESTOS BLANKETS ALSO AVAILABLE.

PULL THE RELEASE —BLANKET DROPS! YOU'RE READY!

OPEN

HOW TO ORDER

	EACH
— Container and Woolen Blanket	$17.40
— Container and Asbestos Blanket	32.35
— 66"x84" Woolen Blanket	8.50
— 66"x80" Asbestos Blanket	23.45
— Container only	8.90
— Container — Outdoor Model	9.50

• DEALERSHIPS INVITED •

GARDWELL Products

Safety CLOTHING & EQUIPMENT Co.
1990 EAST 69th ST. • CLEVELAND 3, OHIO

"Ortho-Vent's best-selling safety shoes are made with neoprene soles. We've used neoprene for 25 years"

E. C. BRAND
Vice President
Ortho-Vent Shoe Co.
Salem, Virginia

Mr. Brand says, "Our experience has shown us that safety shoes are as important in the small plant as they are in the large factory. And buyers of Ortho-Vent safety shoes look for neoprene soling on our products. We now use neoprene soles on every safety shoe in our line."

Neoprene assures high-wearing qualities. It's the only soling material that stands up to *all* rugged working conditions. Neoprene soles are crack-resistant and keep their flexibility on the coldest days. They have excellent oil, grease and chemical resistance. Over the years, new types of neoprene and improvements in established types have kept it the longest wearing, most resilient soling material you can use.

The selling power of the neoprene name can be put to work right on the shoe sole. To add a profitable sales asset to *your* line of work, service and safety shoes, specify neoprene soles and heels. E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department NS-3, Wilmington 98, Delaware.

DU PONT
REG. U. S. PAT. OFF.

NEOPRENE
SYNTHETIC RUBBER

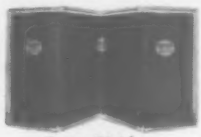
Better Things for Better Living . . . *through Chemistry*

Circle Item No. 99—Reader Service Card

NEW
HANDI-HUT
FROM STANDARD
PORTO SCREEN PANELS
. . . with hundreds of other uses from the same components

HANDI-HUT SECTIONS CAN BE USED FOR —

Welding Screens, Fire Screens, Windbreaks


Room Dividers

Wrap-Around Screens

You get low-cost protection in minutes with Handi-Hut . . . ideal for shops, field maintenance, construction, storage, repair work to protect machinery, building materials, personnel, etc. · Folds compactly, transports easily, assembles without tools . . . and it's lightweight, strong, durable. Can be secured to ground.

Standard sizes 6′ x 6′ x 7′ high, or 12′ x 6′ x 7′ high.

Write for detailed catalog and prices!

FROMMELT INDUSTRIES
Dubuque, Iowa
THE NAME TO REMEMBER IN APPROVED SAFETY PRODUCTS

. . . AND IT FELL ON HIS COMPROMISE

The finest in foot protection is a pair of safety shoes, but you probably have at least one man in your plant who doesn't wear them.

For him the best compromise is StaSafe Toe Clips, impact resistant steel clips that can be permanently nailed or temporarily fastened directly to his work shoes. Lightweight and low cost StaSafe Toe Clips combine comfort with protection.

Write in Today for Toe Clip Bulletin

Standard Safety Equipment Co.
431 N. QUENTIN ROAD • PALATINE, ILLINOIS
604 BROADWAY, NEWARK 4, N.J.
855 EAST 152nd ST., CLEVELAND 10, OHIO
12921 W. WASHINGTON BLVD., LOS ANGELES 66, CALIF.

used with webbing, avoiding loss of strength at buckle holes.

Belts intended to check a fall demand strength proportionate to possible distance of fall and weight of body. A 2-in. by ¼-in. leather belt would probably arrest the fall of a window washer at 6 ft. It might break at 10 ft.

For a comfortable margin of safety, a window cleaner's leather belt should be at least 3-in. by ¼-in.

Webbing of special type is available for certain uses. It can be treated to resist paint and mildew. For the chemical and petroleum industries, webbing impregnated with neoprene resists acid conditions. Synthetic fabrics are also mildew resistant.

Body harness with life line attached expedites rescue if the wearer should be overcome by gas or vapors, buried by falls of loose materials or injured in confined spaces.

Wherever work requires a supplier-air respirator, harness and life line rather than a belt should be used.

If long free falls are possible, harness should be designed to distribute the impact force over legs and chest as well as waist.

Quick release from a safety belt is important where there is danger of fire. Petroleum workers, for instance, use belts with a quick re-

Clean-up crew in chemical plant equipped with safety harness and life line, hard hat, goggles and dual tone signal horns powered by freon gas.

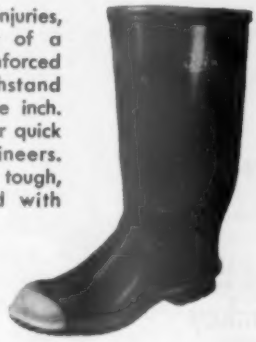
GOODALL

SINCE 1870

Safety PRODUCTS

The Goodall products described below are made to the highest standards for quality in materials and workmanship, with their safety features thoroughly proven in service to many industries. You can purchase them with complete confidence that they will fulfill their intended purpose to your entire satisfaction.

"TOE-SAVER" ® SAFETY BOOTS



Surest protection against toe injuries, with all the wearing comfort of a first-quality boot. Built-in, reinforced steel toe cap tested to withstand 2,000 lbs. pressure per square inch. Covered by a white toe cap for quick identification by Safety Engineers. This boot is made of smooth, tough, flexible black rubber, lined with heavy duck. A cushion insole adds to its comfort, and a tire-tread outsole guards against slipping on wet or greasy floors. Available in all boot sizes, in full hip, three-quarter and short.

"RUBBERHIDE" SAFETY INNERSOLES

Eliminate foot injuries resulting from punctures by nails and other sharp-pointed underfoot objects. Made with sheet of thin, high-tensile spring steel, inseparably bonded between layer of top-grade sole leather, and layer of rubberized canvas duck. Extremely flexible, light in weight, "easy to wear". In all rubber boot and boot-last shoe sizes.

"HARDBOILED" SAFETY HATS

FIBREGLASS OR ALUMINUM

The ultimate in head protection, yet light-weight and comfortable. Exceed highest established requirements for strength; heat, fire and moisture resistance; and dielectric tests. Wide range of colors.

"GOODSEAL" SAFETY GLOVES

Made of a special rubber compound that withstands constant contact with virtually all solids and solutions. Smooth, flexible, and highly resistant to snagging and puncturing. "Goodseal" Gloves are available in light, medium and heavy weights, some styles having turned-up cuffs to keep chemicals and acids from arms and clothing.

PROTECTIVE SUITS, COATS, APRONS

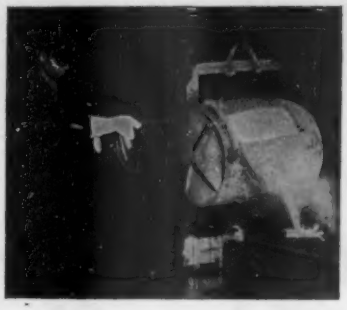
A style for every kind of work in field, plant or laboratory, in rubber, neoprene latex and oiled. Designed for maximum protection and comfort, and made to assure unequalled value through durability and long wear. Write for copy of special Clothing Catalog.

GOODALL RUBBER COMPANY

GENERAL OFFICES, MILLS and EXPORT DIVISION: 710 WHITEHEAD RD., TRENTON 4, N. J.

Branches: Philadelphia • New York • Boston • Pittsburgh • Indianapolis • Kansas City, Mo. • Chicago • Detroit • St. Paul Milwaukee • Los Angeles • San Francisco • Seattle • Spokane • Portland • Salt Lake City • Denver • Houston • Charlotte Atlanta • Miami and Stuart, Florida • Goodall Rubber Company of Canada, Ltd., Toronto • Distributors in Other Principal Cities.

Circle Item No. 101—Reader Service Card



The HEAT'S OFF with LIBERTY ALL - LEATHER HEAT RESISTANT GLOVES

These gloves are not ordinary work gloves, but are made from a patented process on soft, flexible leather, impregnated with insulating and refractory materials.

They have outworn ordinary work gloves six to eight times on many operations. Temperatures from 500 degrees F to 800 degrees F can be safely handled, depending upon the type of glove required.

Not only do they afford protection to the hands, but many hot materials can be handled without tongs or other equipment, thus saving both time and money.

If your dealer cannot supply you, we would be pleased to receive your inquiries.

LIBERTY PROTECTIVE LEATHERS, Inc.

14-16 FOREST ST. GLOVERSVILLE, N. Y.

FOOT-TOE-LEG Protection by "Sankey"

(left) Style #202 Improved FOOT GUARD with full RUBBER SOLE

FOOT GUARDS consist essentially of a metal shield to be worn over the shoe whenever the foot is in danger of being either crushed or cut. The metal shield is designed to furnish a maximum amount of protection to the entire foot—not merely to the toes alone, but also to the instep—against hazards from falling, rolling or flying objects, or from accidental tool blows.

TOE GUARD → fills a demand for toe protection in occupations where hazards injurious to toes exist. They fit any shoe, afford maximum toe protection, and like the foot guards do not encase the toe to the discomfort of the worker. (Style #702 illustrated.)

COMBINATION FOOT AND SHIN GUARD (right) consists of a shin guard fastened to the foot guard in a manner permitting free action of the leg in any direction. Constructed of light but strong aircraft quality aluminum alloy. (Style #400 illustrated.)

For more information write today

ELLWOOD SAFETY APPLIANCE CO.

225 SIXTH ST.—NSC ELLWOOD CITY, PA.

lease buckle which can be disengaged instantly by a single motion of the hand.

Boatswain's chair. Where a belt must support the entire weight of a man while he works, as in raising and lowering him along the wall of a building, a boatswain's swing chair should be used. In this type of belt, one strap is used as a seat, sometimes with a board to make it more comfortable. Attached to the seat strap at each side is a strap around the waist to prevent his falling out of the seat. The waist strap permits the wearer to stand or sit.

Tool buckets of collapsible canvas are needed on some jobs so the worker may have his hands free while climbing. Edge tools should be protected by guards while being carried.

Belts for some occupations contain loops and pockets for light tools.

Shock absorbers incorporated in life lines reduce the severity of impact. This decreases both the possibility of injury to the wearer and failure of the equipment.

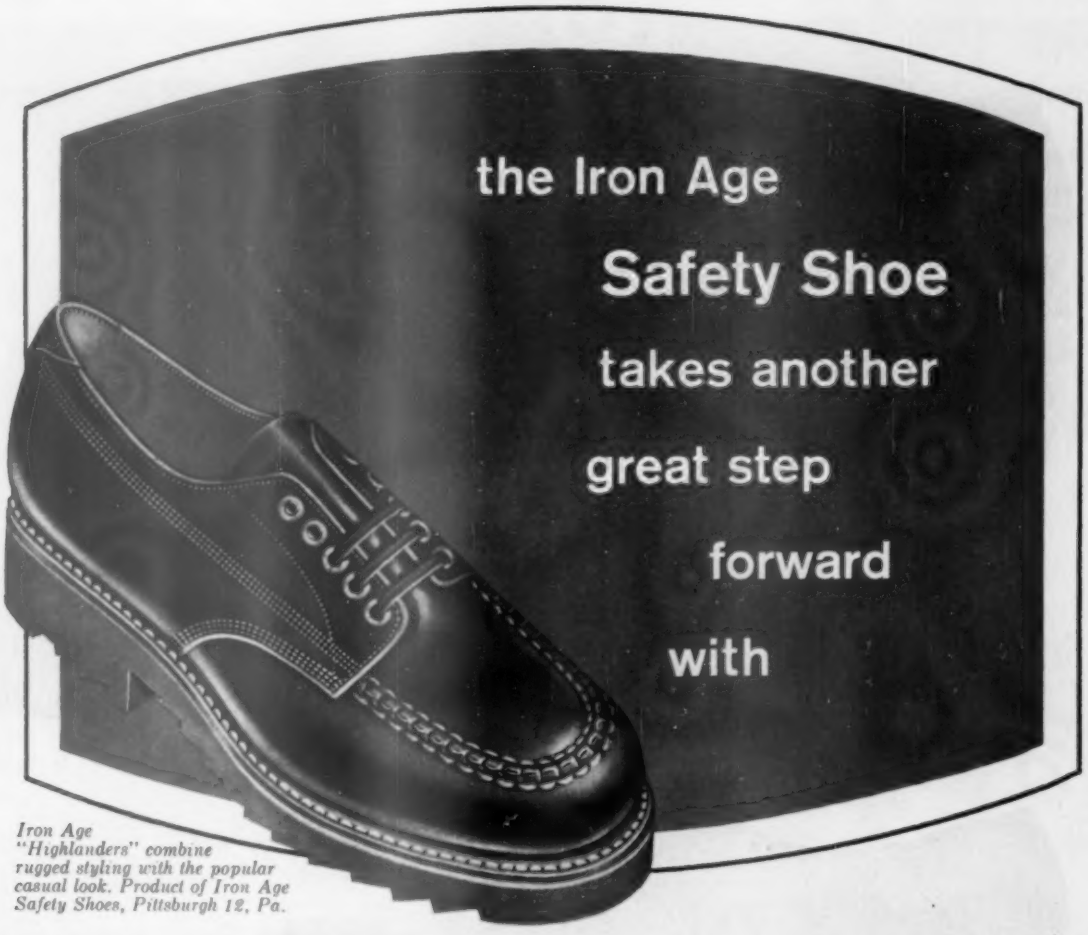
Life lines. For most life lines, ¾-in. manila rope or ½-in. nylon rope is recommended.

Nylon rope has more stretch than manila which enables it to absorb shock and sudden loads. It has high tensile strength wet or dry, is tough, flexible, durable, and easy to handle—resists moisture and mildew and can be stored wet.

Steel cable without a shock absorber should not be used for life lines where a free fall is possible, because its rigidity increases the

—To page 160

All safety belts should be washed frequently. Leather should be treated with regular applications of neatsfoot oil.



Iron Age "Highlanders" combine rugged styling with the popular casual look. Product of Iron Age Safety Shoes, Pittsburgh 12, Pa.

PACIFATE® PROTECTED LININGS

Iron Age

New Iron Age Safety shoes are doubly safe! The steel toe cap keeps your feet out of danger—and the new Pacifate Protected Linings keep you *hygienically safe*. This amazing germicidal process by famous Pacific Mills lasts for the life of the shoe, preventing reinfection from Athlete's Foot, retarding foot odors due to bacterial decay and perspiration. In addition, Pacifate preserves the shoe from rot and wear, prevents drying and cracking, making Iron Age Safety shoes a better value because they last longer and are more comfortable. Look for the Pacifate name on the lining when you buy Iron Age Safety shoes. The only lining approved by the National Foot Health Council, Pacifate in *any* shoe means you're getting top quality. You can choose Iron Age Shoes with Pacifate linings in a variety of handsome styles that combine rugged wear and supreme comfort. Shoes carry descriptive tags. Literature available.

APPROVED NATIONAL FOOT HEALTH COUNCIL FOR BETTER FOOT CARE

Wamsutta / PACIFIC INDUSTRIAL FABRICS

1430 Broadway, New York 18, N.Y.

Circle Item No. 103—Reader Service Card

Circle Item No. 104—Reader Service Card

S-1374

S-4309 (B&B), S-1309 (BLACK)

S-4385 (BROWN), S-1385 (BLACK)

What do these dress shoes have

You could never tell just by looking, but these dress shoes *are* safety shoes, made on a dress shoe last. All are new for 1960. The handsome job they do is no news to plant managers and their men. Name a *hundred* jobs, and in thousands of plants all over the country, you'll find Thom McAn's 41 styles of safety shoes doing them—giving protection, comfort, style, wear. Dependability! *All the shoes here feature a leather-lined safety steel toe box and a steel shank.*

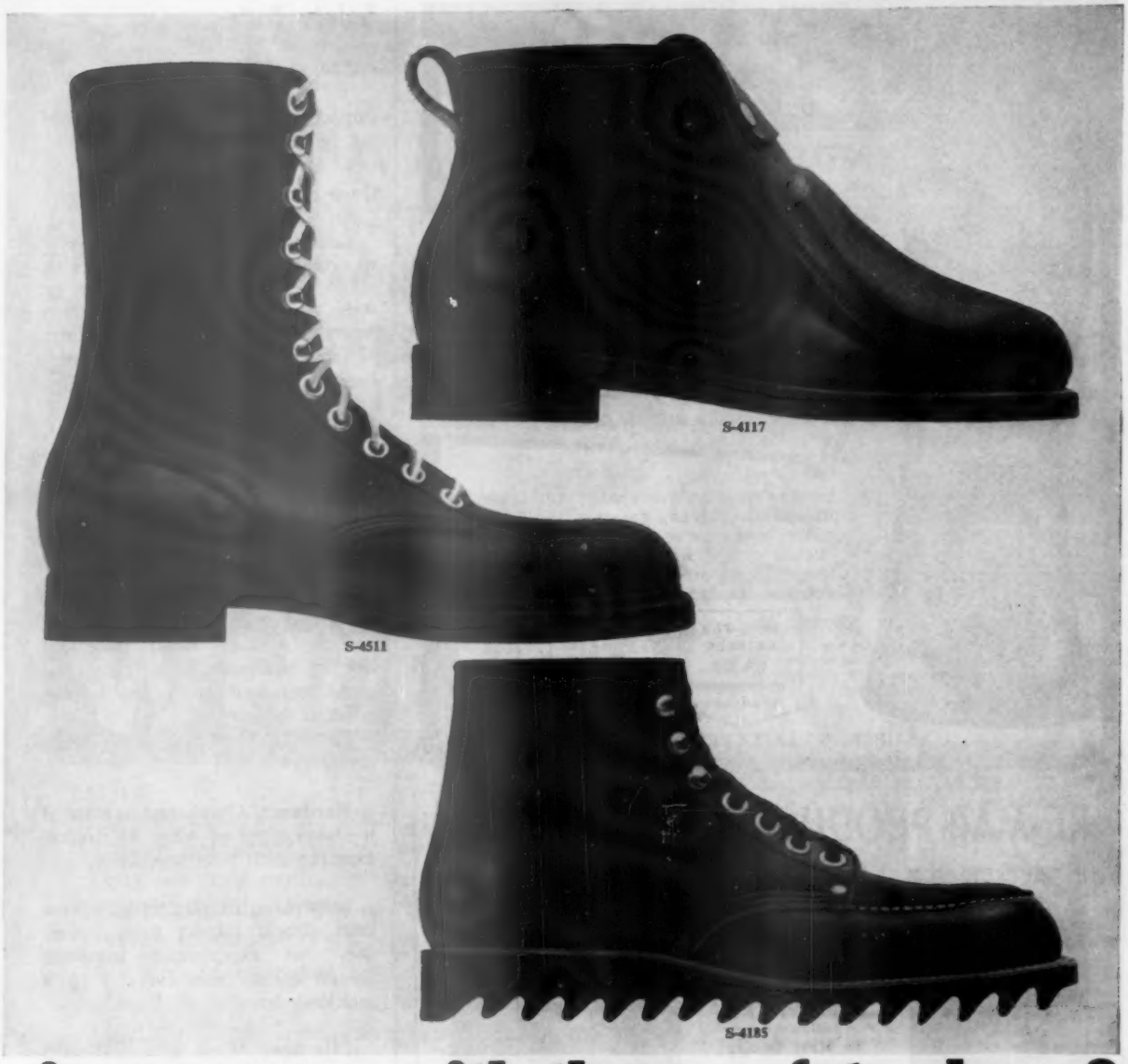
S-1374—THE CUSHION MOCCASIN. For the man who wants comfort (who doesn't?), here's a handsome black 5-eyelet moccasin oxford with a special shank construction and the famous Thom McAn cushion insole lined with soft glove leather. Tough butyl-leather outsole is made to military specification. B 8-12, C 7-12, D, E, EE 6-12.

S-4309—THE B & B LANCER. It's the Continental touch, brown brushed with black! It's a safety toe slip-on that looks like a million. C 7-12, D 6-12, E 6-11.

S-1309—THE BLACK LANCER. Wear these shoes to a dance and we defy anyone to spot them as safety shoes. Wear them on the job—and you've got yourself easy comfort and good protection. C 7-12, D 6-12, E 6-11.

S-4385—THE RIPPLE® SOLE OXFORD. Ripple® sole is water-, grease-, oil-resistant. Helps prevent skids. Helps lessen fatigue. And looks great: it is a rich burnished brown that resists scuffs. B 8-12, C 7-12, D 6-13, E 6-12.

S-1385—THE RIPPLE® SOLE OXFORD IN BLACK. Water-, grease-, oil-resistant, helps prevent skids. C 7-12, D, E 6-12.



in common with these safety shoes?

S-4117—THE HIGHGUARD. Perfect for heavy duty. A special plastic plate helps eliminate painful injuries to the instep area. Snap-top tongue keeps out dirt, gravel. Neoprene® cord sole gives maximum protection against acids, chemicals. D 6-12, EE 6-12.

S-4511—THE CHEMBOOT. Especially great around chemicals. Quilon®-tanned, 10″ brown work blucher, rawhide laces, Neoprene® cord sole and heel, Dacron® stitched throughout. D, E, EE 6-12.

S-4185—THE 6″ RIPPLE® SOLE BOOT. Good for rough indoor and outdoor work. Helps prevent skids, lessens fatigue, resists oil and water. Warm, amber glove-soft leather, with a moccasin upper. C 8-12, D, EE 6-12.

Thom McAn Safety Shoe Division, 25 W. 43 St., N. Y. 36

Gentlemen: Please send me the following at once: (Check service required)

- ☐ Details of Thom McAn's Sales Plans
- ☐ Illustrated list of Thom McAn Safety Shoes
- ☐ Set of safety posters

Name_____ Position_____

Firm_____

Address_____

City_____ Zone____ State_____

N.S.3

Thom McAn SAFETY SHOES

A DIVISION OF MELVILLE SHOE CORPORATION

Circle Item No. 105—Reader Service Card

Seiberling
INDUSTRIAL GLOVES
EXCLUSIVE PATENTED
FIRMGRIP®
SAFETY GRIP
MOULDED INTO FINGERS
AND PALM
Longer wear in every pair! Available in various sizes, gauges, lengths, colors and surface finishes. Natural rubber or genuine Dupont neoprene latex. Contoured fingers for more comfort, better fit.
SEND FOR CATALOG NO. G-6 of complete glove line
FREE TEST OFFER!
Write us on your firm's letterhead for sample gloves for test purposes.
SEIBERLING LATEX PRODUCTS, New Bremen, Ohio

Safety Belts

—From page 156

impact load. Metal cables should not be used around electricity.

Care of Belts

Leather. Brush dust off carefully to avoid scratching. Then wash with warm water and saddle soap or mild soap. Rinse in clean, warm water and dry at room temperature.

Treat with neatsfoot, castor, soybean, or a compound oil, not a mineral oil.

Never expose to excessive heat.

Watch carefully for cuts or scratches on the skin side of the hide. Condemn if there is a deep cut on the skin side.

Webbing. Fabric belts should not be worn if outer plies are cut or worn through.

Wash in soapy water, rinse and dry in moderate heat. They will stand any heat up to the boiling point of water.

Consult manufacturer about dressing.

Hardware. Check and replace if it shows signs of wear. If riveted, examine each rivet separately.

Inspection. Employees who wear belts should inspect them before use. An experienced inspector should check them every 1 to 3 months.

Life lines. Wash with mild soap and water and dry in circulating air. Do not expose to high temperatures. Keep rope in open coils; never bend sharply. * * *

"But, Henry, you've always told me it's unsafe to overload a boat."

FUNCTIONAL DESIGN
FINEST MATERIALS
FINEST FABRICATION
FORTY YEARS' EXPERIENCE

ONLY FROM . . .

WHEELER

Better designs for both protection and fit—many patented! Finest materials money can buy—many exclusive with Wheeler! Finest fabrication out of our sewing rooms! And forty years of experience in the safety field!

This is what you get *only from WHEELER.* Our line is complete and offers the best in protection from heat, abrasion, corrosion and impact. It pays to traffic in safety—at Wheeler!

Remember, it's a safety sin to buy less than the very best!

SEND FOR COMPLETE CATALOG

Complete bible on safety clothing (63 pages). A complete line of heat, acid, abrasion and impact resistant clothing. All essential ordering information. Get your copy today!

FIRE KING (Patented & Registered)

FIRE ENTRY SUITS

Sturdy 3-ply, Tropic U.G. aluminized* asbestos outer layer, insulated middle layer. Inner silver neoprene coated fiberglas vapor barrier. Hard hat, pyrex vision.

CLOTHING

High quality heat, corrosion and abrasion resistant fabrics. Coats cut to chest size, with "free-swing" contour sleeves. Pants to match, cut to waist size. Also one-piece special purpose suits.

OVERSHOES

New closed tongue design with adjustable straps. Fits over regular shoe, or fireman's boot.

LEGGINGS

Patented Leg-Safe style (as shown), or Spring Knee style. On and off in a jiffy! Half Leggings and Hip Leggings also obtainable. Wide choice of materials.

POWER MEGAPHONES

Issue effective commands. Powerful transistor units. 3 styles . . . pin-point or flare sound patterns.

HELMETS

Wide range of materials designed to fit over wire, fiber, fiberglas, and hard hat frames, with adjustable head bands. Screen, Homalite, and Pyrex vision with reflective cover windows.

ARM PROTECTORS

Patented wire screen style especially effective in handling sheet metals. Cool, no dermatitis problems. Several leather styles also.

GLOVES AND MITTENS

Wheeler Weave U.G. asbestos and aluminized asbestos, 11", 14", 23" lengths. Lined or unlined, leather reinforced or plain. Complete leather and steel stapled line.

PROTECTIVE WHEELER APPAREL

Wheeler PROTECTIVE APPAREL, INC.

226 W. Huron Street • Chicago 10, Illinois • SUperior 7-1156

Leg Protection

PROTECTION for the legs is required where workers are exposed to the hazards of hot materials, corrosive substances, blows from sharp tools or heavy objects, and bites of poisonous snakes.

Garments commonly worn are:

1. Spats
2. Leggings
3. Shin guards
4. Knee pads

Leggings. For men who are exposed to direct or conducted heat, as in foundries and steel mills, leggings are available in asbestos chrome leather and flameproofed duck in spats, knee-length, and hip-length. For radiant heat aluminized asbestos and duck are worn.

Where molten metal is handled, leggings should have flares to protect the instep. They should be free from projecting buckles and clasps and be instantly removable.

For protection against corrosive and relatively harmless liquids, leggings are available in knee and hip lengths and a variety of impervious materials.

Impregnated duck offers protection against moisture and detergent solutions.

For more severe exposures, fabric coated with plastic, natural rubber, or neoprene gives greater protection.

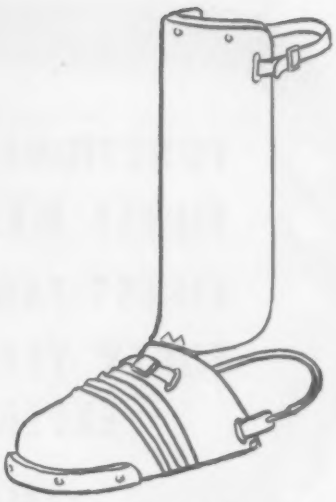
Plastic resists oils, solvents, mild alkalis, and acids.

Rubber offers protection against concentrated acids, alkalis, and salts.

Neoprene resists oils and organic solvents.

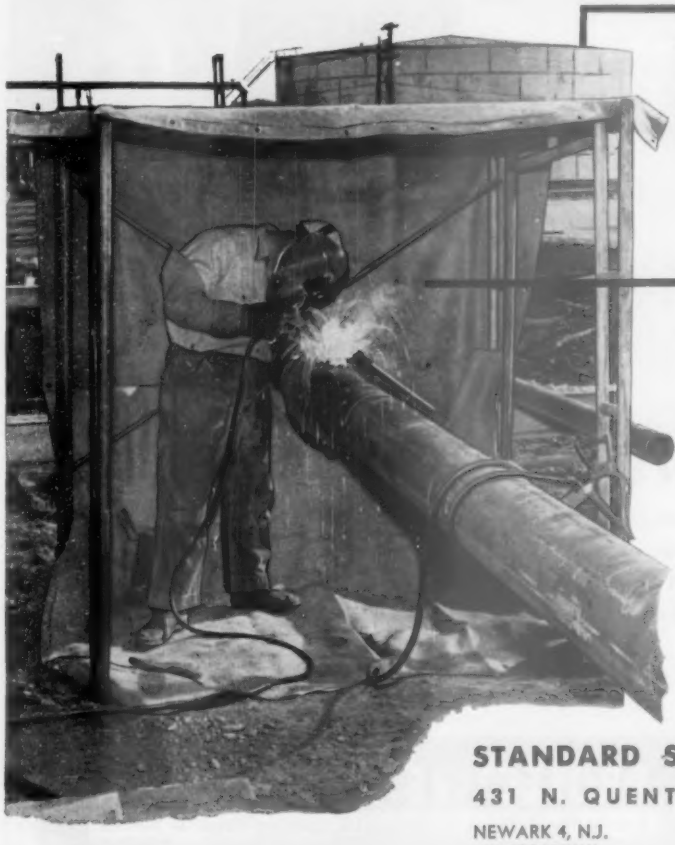
For more severe exposures, fabric dampness and corrosive liquids, there are boots of natural rubber, synthetic rubber, and plastic. These are available in knee and hip lengths, also waders similar to those used by duck hunters and fishermen.

Where poisonous snakes are a hazard, heavy leggings or high boots are worn by construction, public utility, and farm workers.



Combination shin and footguard.

Shin guards of metal or fiber provide important protection where axes or adzes are used. Shin guards are available separately or combined with metal foot guards which cover the instep.



TARPS THAT TAKE A DRENCHING IN SPARKS

...and go right on protecting

This photo shows a STA-SAFE Tarp at work in a large oil refinery where the constant threat of fire demands positive protection. Even after long use on outdoor welding jobs, and repeated exposure to oil, this STASAFE Tarp still gives the superior safety required. The weather has no effect on its flame resistance and oil, dirt and greases wash right off!

Regardless of the application, STA-SAFE Welding Tarps never lose their fire resistance. They last longer, cut your replacement costs to an absolute minimum.

For more information, write today for your bulletin *StaSafe Welding Tarps*

STANDARD SAFETY EQUIPMENT COMPANY

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SAFER on any SURFACE

- Massive opposing rib design for positive ground grip — no backward slip
- Light weight for cushioned comfort
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ROTOGRIP

Newest addition to the Bearfoot family of soles for Busy Feet.

Oil resistant

Resists dirt pickup

Lightest of its type

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Cushioned comfort

Made with oil resistant neoprene. Where rough going is routine or where sure footed, non-slip soles are essential, wise shoe buyers insist on Bearfoot Rotogrip Soles. They're the mark of extra safety, comfort, and service on any work shoe you buy.

A trusted name on shoe bottoms since 1924

THE BEARFOOT SOLE COMPANY, INC.

WADSWORTH, OHIO

BOSTON: 210 LINCOLN STREET, H. T. FOGG, MANAGER
MILWAUKEE: 1931 S. ALLIS, ATKINSON SALES CO., INC. • ST. LOUIS: 1602 LOCUST STREET, D. W. MURRAY, MANAGER • GLENSIDE, PA.: 124 S. EASTON ROAD, R. L. STILES & CO. • NEW YORK: 225 WEST 34th STREET, HOMER BEAR

Knee pads are worn by electricians, pipefitters, riggers, cement workers, laborers, and others who must kneel more or less continually at work, particularly in confined spaces.

Two types are available. One consists of a pad or cushion made of chrome leather or asbestos cloth. This type is used for kneeling on hot surfaces. The other type is made of solid or sponge rubber molded to fit the contour of the knee. Straps keep the pads in place while the wearer is either kneeling or standing.

Recommendations for Auto Seat Belts

Automobile seat belts have proved their value in preventing death or serious injury in many a crash. But the protective value of the belt will depend largely on the quality of the belt and method of installation.

Seat belts are being installed in more and more private and company cars. Here, Charles G. Mortimer, president of General Foods, tries one as Charles A. Clark, safety coordinator, explains their importance. The company recently had belts installed in all official and sales cars.

The variety (and varying quality) of belts on the market today makes it advisable to buy from a reputable dealer. The Automotive Crash Injury Research Group at Cornell University recommends that:

1. Loop strength of belt and buckle be at least 3,000 lbs.
2. The belt be at least 2 in. wide.
3. Only one person be supported by a belt.
4. The buckle be simple to operate and easy to release.
5. The belt be anchored to the car frame, not the seat.

Seat belts must be comfortable and convenient to use, and be worn at all times. For maximum protection, they should have not more than 4 in. of slack—not too tight or too loose.

Hands and Arms

—*From page 138*

Linemens' gloves are rubber gloves worn by linemen and others engaged in electrical work. They are of a special type made to exacting specifications. They should be tested regularly and discarded when found worn, cracked, or punctured.

For line work, overgloves of leather protect the rubber against damage.

Gauntlets offer some protection to the wrist. When corrosive substances are handled, sleeves should be worn outside gauntlets.

Circle Item No. 109—Reader Service Card

Protect Your FEET

The Reece Way

No. 351
Sizes—Small - Medium - Large
"When the chips are on the floor
Step in WOOD SOLES at the door"
Light weight—strap on quickly over any shoe —walk safely on chips, hot ovens, cold floors.

No. 251—one hinge
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No. 504-S
Sizes—3 - 13 incl.

Reece STRONG STEEL TOE is HIGH and ROOMY

Reece WOOD SOLE is E. Z. WALKING—heat-proof—coldproof—puncture proof.
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There is no substitute for Reece Wooden Soles

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"Aljay's Saf-T" Clothing
Assures Best Body Protection
Made of Finest Chrome Tanned Leather for Heat Resistance.
• High Quality
• Full Size
• Soft & Pliable
• Riveted
★ Pearl or Brown Leather
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Write for Catalogue Sheets, Price List

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...the finest gloves at the fairest prices

- **ON-THE-SPOT SERVICE** . . . industrial specialists near you to help select the right glove for each job . . . seven local warehouses to speed deliveries and meet emergencies.
- **PLUS FREE IMPRINTING:** A valuable Riegel extra . . . Your choice of safety slogans or name printed on backs or cuffs . . . no extra charge on any style with minimum order of 150 lbs.
- **COMPARE WITH ALL OTHERS** for comfort, protection and lowest cost per day of wear.
- **TOP QUALITY . . . COMPETITIVELY PRICED** . . . from the largest company making work gloves.

MORE THAN 400 STYLES TO FIT THE JOB

60-53051L1—Mighty-Grip™ over-all Mighty-Dot™ Fabric

96651—Extra heavy top-quality leather palm

936 Genuine horsehide palm heavy duty welder

43141J—Jumbo size Hot Mill

13011—8-oz. Canton flannel

28571A—18-oz. quilted double palm

95651—Leather palm, waterproof safety cuff

99652—Special tanned, green leather palm

43121—Large size Hot Mill

33011—Reversible, 8-oz. canton flannel

28071—18-oz. quilted double palm

72031—Leather palm with knit wrist

21401A—22-oz., nap in, double palm

64-72051—Leather palm, red Mighty-Dot® back

Riegel

...GLOVES THAT WEAR ON WHEN OTHERS WEAR OUT

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RIEGEL TEXTILE CORPORATION
CONOVER, N. C.

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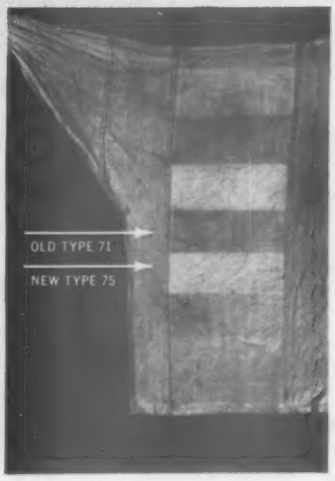
New, tougher reflective fabric wears longer, reduces your costs

Greatly improved reflective-protective garments made of new "Scotch·Shield" Aluminized Fabric wear *two to three times longer*. They outlast garments made with the original "Scotch·Shield" fabric which first introduced a new concept in heat shielding to industry. Longer garment wear means fewer replacements, lower cost for really *effective* safety garments: hoods, jackets, coats, coveralls, aprons, sleeves, gloves, leggings and complete suits!

Greater durability combined with exceptional heat reflective, spatter resistant performance of new "Scotch·Shield" Fabric keeps hot spot workers cool, safe. They can move easily and comfortably even when exposed to intense radiant heat — do their jobs better, faster with substantial savings for industry.



Proof of new durability:

This millworker's test apron has alternate sections of new Type 75 Fabric and older Type 71. It was used on the job—subjected to extreme heat and wear for 4 weeks. Note how the Type 75 Fabric surface has retained its reflective surface and resisted fabric breakdown.

SCOTCH·SHIELD BRAND ALUMINIZED FABRIC

MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW

Minnesota Mining and Manufacturing Company, Dept. RBY-30, St. Paul 6, Minnesota
Please send me complete information and free samples of new "Scotch·Shield" Aluminized Fabric.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone___ State_____

Arm protectors guard the forearm against cuts and light blows. The materials, depending on the protection required, include duck, wool, leather, rubber, plastics, and asbestos.

Finger stalls may be used where a complete glove is not necessary. These are available in combinations of one or more fingers. Materials used are rubber, leather, plastic, duck, asbestos, and metal mesh.

Hand pads are often more satisfactory than gloves for protection from heat, abrasion, or splinters. They can be heavier and less flexible than gloves.

Hand pads are obtainable in leather, asbestos, and twisted weave fabric.

Laundry and repair service. In many cities industrial laundries clean and repair gloves, hand pads, arm guards, aprons, leggings and other garments. Soiled and worn garments are collected each week and returned, cleaned and mended. Where such service is available, companies supplying it are listed in the local classified telephone directories.

Shoulder pads worn while carrying long sections of pipe or lumber prevent cutting of the shoulders and reduce fatigue.

Protective Creams

Creams are helpful in protecting the skin against many irritants when safety clothing is not practicable. These products are made in water-soluble and water-resistant types, each in several grades for differing exposures.

Water-soluble creams are used for protection against such irritants as cutting oils, paints, lacquers and varnishes.

Water-resisting applications are used where the cutting oil, cooling lubricant, or other irritant has a water content of more than 10 per cent. These can be removed with soap and warm water. They make it easier to cleanse the skin thoroughly after work.

To be effective, coatings should be renewed frequently. They are not intended for protection against highly corrosive substances. * * *

NEW "ULTRAPRENE" SAFETY SOLE

- Long-wearing Neoprene
- Non-marking
- Oil-resistant
- Safety plate Design

Available in black, brown and neutral.
14 Iron reduced shank

Samples upon request

Manufactured by

QUABAUG RUBBER CO.
NO. BROOKFIELD, MASS.

See for Yourself...

...test any piece of safety equipment you now use, against its Safe-Hi counterpart. If your present equipment holds up safety-wise against Safe-Hi, I will pay you double the purchase price of your equipment.* If it fails where Safe-Hi Equipment holds up, you are under no obligation—save your moral obligation to equip your men with the *best* safety equipment available.

To arrange for such a test*—at our expense—write to me direct. Take me up on this challenge! You have nothing to lose—and you may save employees' lives. Write me TODAY!

Clarence W. Rose MA

*These tests to be conducted under agreed prearranged conditions and under your control.

Member—American Society of Safety Engineers. Veterans of Safety

The Case of the Belt that Pulled the Man—and his shoulders!

The equipment was strong enough, but as the workman was pulled through the narrow shaft to safety, his arms were pulled behind his back—dislocating his shoulders! His painful experience was caused by a wrist rescue belt that *pulled the wrong way*, twisted his arms and shoulders and hospitalized him!

Safe-Hi Wrist Rescue Belt

...is safety-engineered to pull a man through a small opening. Full freedom of movement is permitted, but Wrist Rescue Belt will pull the arms of an unconscious man up *forward* from any position, preventing shoulder dislocations. Safe-Hi Safety Equipment *is* safe—just as safe as continuous research and a lifetime of experience can make it. For complete information on Safe-Hi Wrist Rescue Belts, Lanyards, Shock Absorbers, Belts, Ladder Shoes...write for FREE catalog.

Safe-Hi Safety Equipment is made by

rose manufacturing co.

© ROSE MFG. CO.

RO-5

2700 W. BARBERRY PLACE • DENVER, COLORADO

Products of the Plastics Age

PLASTICS, a term which describes an enormous variety of moldable synthetic substances, provide the raw material for countless products used in modern living and in industrial processes.

These plastics have a wide range of characteristics. Some are transparent or translucent; others are opaque. They can provide tough, pliable films or hard shatter-resisting masses.

Many plastics have important uses in protecting the worker against accidental injury and occupational diseases. They are used for protection against falling and flying objects, corrosive and toxic chemicals, dusts, gases, vapors, and other injurious agents.

Transparent plastic with good optical qualities is used for goggles and face shields, including corrective lenses.

Compounds can be made resistant to oils, acids, and most organic solvents. Some are shatter-resistant, nonconductive of electricity, and heat and cold proof.

Nontoxic, odorless and tasteless plastics are suitable containers for food products. They can be molded to very close tolerances. Most of them can be produced in a wide range of colors.

Articles of safety equipment in which plastics are used include:

1. Goggles and face shields.
2. Hard hats.
3. Respirators, gas and dust masks.
4. Garments of plastic film or coated fabric.
5. Containers for first aid kits.
6. Instruments for the dispensary.

Types of Plastics

Following is a list of the more common types of plastic materials with their properties and principal uses:

Acrylics. Optical clarity, shatter resistance, weather resistance, machinability, wide color range.

Uses. Goggles, face shields, aircraft turrets, auto taillights, signs, brush backs. Dynel, Acrilan, Orlon textiles for work clothing.

Alkyds and Resin Modifications. Good electrical insulation, heat resistance, dimensional stability, fast curing.

*9 HIGHLY STYLED, COMFORTABLE SAFETY SHOES

Completely Stitched with Dacron

RICO

DESIGNED TO GIVE "Get-up-and-Go" THROUGH THE LONGEST, TOUGHEST WORK DAYS!

VULCANIZED SAFETY SHOES

Single Neoprene Sole and Heel Unit Vulcanized Directly to Uppers. Eliminates Sole and Inseam Stitching. Highly Liquid Resistant.

No. R-29 Quilon Processed. Brown.

No. R-96 Quilon Processed. Brown.

INDUSTRY'S Favorites

Nos. S-407 and S-477 Offer Maximum Comfort with Cushion Insoles and Soft Glove Tanned Uppers.

Nos. R-11 and R-56 are the Most Basic and Rugged Styles Available in Safety Shoes.

No. S-407 Desert Butternut.

No. S-477 Desert Butternut.

No. R-11 Quilon Processed. Brown Elk.

No. R-56 Quilon Processed. Burgundy Elk.

GUARD-AIRE Custom Made

CUSTOM MADE

(Nos. G-23 and G-40 only)

No. G-23 Copper Tan.

No. G-40 Quilon Processed. Burgundy.

10½" ENGINEER Safety BOOT.

No. R-69 Quilon Processed. Black.

*There's a RICO SAFETY SHOE for every "JOB IN INDUSTRY". Our CATALOG shows our highly diversified lines. Send for it today!

RICO

RECORD INDUSTRIAL COMPANY

DEPT. 9S, 3301 ARCH STREET, PHILADELPHIA 4, PA.

Uses. Paints, ignition parts, magneto rotors, linoleum surfacings.

Aminos (Urea and Melamine). Good electrical insulation, resistant to organic solvents, unlimited color range.

Uses. Buttons, dishes, laminated table tops, housings for kitchen appliances.

Cellulose Plastic Materials. Toughness, high impact strength, good electrical insulation, ease of fabrication, lustrous finish.

Uses. Frames for eyeglasses, irrigation pipe, display packaging, rayon and acetate textiles.

Coumarone—Indene and Petroleum Resins. Resistance to water and caustic cleaners, compatibility with compounding ingredients.

Uses. Asphalt floor tiles, waterproof coatings, aluminum paints, printing inks.

Epoxies. Excellent adhesion, resistance to chemicals and heat can be cured at room temperatures.

Uses. Adhesives, surface coatings, transformer and motor laminates, printed circuit backing.

Fluorocarbons. Extreme resistance to solvents and corrosive agents, high impact strength, wide temperature range.

Uses. Chemical tubing, high temperature insulation, pump diaphragms.

Nylon. Good strength and toughness over wide temperature range, wear resistance, self-lubricating.

Uses. Gears, rope, brush bristles, slide fasteners, combs, nylon textiles.

Phenolic and other tar acid resins. Hard and rigid, good electrical insulation, low water absorption, good temperature range.

Uses. Protective hats, goggle frames, grinding wheels, plywood, telephone handsets, radio-TV cabinets, shell molding, dials.

Polyethylene. Inert to most solvents, flexible and tough over wide temperature range, non-toxic, odorless, tasteless.

Uses. Coaxial cables, semi-rigid kitchenware, squeeze bottles, packaging.

Polyester Resins. Weather-resistant, strong, formable with low pressure, compatible with many fillers.

Uses. Reinforced plastics for auto bodies, boats, translucent panels, Dacron textiles.

Silicones. Extreme heat resistance, good dielectric properties over wide frequency range, low water absorption.

Uses. Insulation for generator coils, circuit breakers, waterproof coatings, auto polishes.

Styrene Resins. Lightest of commercial plastics, excellent moldability, tasteless, odorless, unlimited color range.

Uses. Lighting fixtures, wall tiles, refrigerator parts, kitchenware, toys, and novelties.

Vinyl Resins. Tough and strong, excellent electrical insulation, resistance to chemicals, oil and weathering.

Uses. Floor tile, protective garments, metal and fabric coatings, rainwear, pipe and pipe fittings, valves, electrical insulation, machine and structural parts.

Note: Data presented in this table were obtained largely from The B. F. Goodrich Co. and Bakelite Corp.

Bashlin's
Linemen's Choice
SAFETY EQUIPMENT
Semi floating, Shifting "D" Safety Belt with nylon Safety Feature
Industrial Web Safety Harness
Adjustable and Standard Climbers Steel or Aluminum
Electricians' Tool Belt with or without Holster
Double Axe Guard Fibre, Wood Bottom
Leather Safety Straps 24 Styles
Shifting "D" Safety Tool Belt with Built-in Nylon Safety Feature
Leather or Fibre Pruning-Saw Guard
Canvas Tool Bucket—Non Metallic Fibre Top —Leather Bottom
Linemen's Leather Tool Holsters
Write for Catalog 54-S
BASHLIN'S
W. M. BASHLIN COMPANY
GROVE CITY 3, PA.

Vibrating Tools

Vibrating tools are inevitably noisy, and such noise can seldom be controlled adequately at the source. Where noise is excessive, ear plugs should be worn.

Injurious effects other than hearing loss may result from continued use of these tools. Excessive vibration can cause lesions, ranging from numbness in the finger tips to bony changes and inflammation of tendons above the shoulder joints.

Vibrating tools, operated by air or electricity, include hammers, drills, tampers, riveters, calkers, etc.

Lesions seldom extend above the forearm and more often are limited to the fingers, hands and wrists. Sometimes a neurosis develops which can be more trouble than the other symptoms.

These procedures have been recommended:

1. The grasp should be firm rather than tight.
2. Sponge rubber or cork grips reduce shock.
3. Strapping the wrist may be helpful.
4. A worker should be removed from the job when evidence of injury appears.
5. Workers with arthritis or diseases of the circulatory system should not operate vibrating tools.
6. Air exhausts should provide minimum contact with the operator.
7. New employees should have short working periods while becoming conditioned to the work.
8. Mounted or suspended supports, where practicable, can carry much of the shock.
9. During cold weather, hands and fingers should be kept warm.

Vital Statistics on Women Workers

About 22 million women are in the nation's labor force. This is 36 per cent of all women of working age (14 years and older). Right now female employees outnumber men of working age by three million.

Half of the women workers are 40 or older, and almost two-fifths are 45 or older. The war and postwar baby crop will enter the labor force in the 1960's but, with added older workers, isn't expected to greatly alter the average age of women workers.

Three-tenths of employed women are clerical workers and include more than two million stenographers, typists, and secretaries. One-fourth are service workers and include one million waitresses and cooks. About one-seventh are operatives, chiefly in factories. One-eighth are professional or technical workers and include more than one million teachers.

More than half of women workers are married. Of all married women, about 30 per cent are working. Of single women 20 to 64 years of age, more than 75 per cent are working. Fewer than one-eighth of all women have children under six years old.

Almost all American women are likely to work outside the home at some time during their lives. Current schoolgirls may expect to spend as much as 25 years or more in paid work outside the home. And two of five mothers with school-age children are in the country's labor force.

Genuine, Spring-action

*RIPPLE® Sole

You'll stand and walk in greater comfort and safety than you've ever known before! Shock-absorbing, spring-action sole reduces fatigue . . . cause of many late day accidents . . . to let you work on your feet *hours longer without tiring!* Best possible traction on wet or slippery surfaces! Try them . . . enjoy them NOW!

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Cotton work pants after less than one week under corrosive conditions.

Worklon pants of 100% Dacron after months of wear under same corrosive conditions.

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A variety of **lint-free** and **static-free** acid-resistant styles to meet your every requirement. Read complete details in the new Worklon catalog just off the press. **New lower prices ... larger selection** of garments for both MEN and WOMEN. Send coupon for your **free** copy now!

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CONSULTATION CORNER

Questions on accident prevention, fire protection and occupational hygiene are answered by mail. A few are selected for publication.

By L. C. SMITH, Industrial Department, NSC

Dual Lifts

Question: What information do you have concerning dual lifts with cranes? We may be confronted with the necessity of using two cranes on one of our construction jobs and we want to be prepared.

Answer: According to the authorities on this subject, dual lifts should be avoided if at all possible.

If absolutely necessary, it should be done only under competent supervision throughout the operation. The position of the cranes and the location of the slings to balance the load properly must be carefully planned. Shifting of the load while making the lift could cause overloading and failure of one crane, thus throwing the entire load onto the second crane and resulting in failure of both cranes.

Special signals may have to be agreed upon and rehearsed. Where the maximum capacities of the cranes may be approached, the movements should be sketched. Also, a qualified engineer should be consulted to make a mechanical analysis.

Where there is a need for making continuous lifts on heavy loads a single crane of sufficient capacity should be provided.

Hazards of Mercury

Question: In one of our shops considerable amounts of mercury have been used over the past few years. Also, there has been some spillage and I am afraid the area contains concentrations of mercury vapors. Can you give me any information?

Answer: From your letter it does appear you may find rather high concentrations of mercury vapor in the air, since no doubt this spillage has been going on over several years. Mercury is a cumulative poison, so areas where people are working should be checked carefully. Ultraviolet photometers are lightweight instruments that will give you the concentrations of mercury present in the air, ranging from 0.03 milligrams per cubic meter to 3 milligrams per cubic meter. Such instruments are relatively simple to use.

The maximum acceptable concentration for mercury is 0.1 milligrams per cubic meter.

Calcium polysulfide has proved very successful in subduing mercury in contaminated areas. Several commercial preparations containing calcium polysulfide are available.

These preparations are relatively safe to use, but may in the presence of strong acids generate hydrogen sulfide. Rubber gloves should be worn during application, if the hands are to come in contact with the suspensions.

For hard-to-clean areas such as pits, sumps, etc., it may be advisable to dust flowers of sulfur on areas known to be contaminated with mercury. Allow the sulfur to remain on the contaminated area for a minimum of 24 hours, then clean up and package for disposal.

Since wood, concrete and plaster floors laid with cracks between the tiles are difficult to decontaminate, the mercury contamination can be sealed into such floors by covering them completely with an asphalt mastic preferably after the vapor tension of the mercury has been reduced by flooding the whole area with a lime sulfur spray.

To prevent areas from becoming contaminated, operations using metallic mercury should be carried on over impervious tables or impervious containers with the surface depressed and arranged to drain to a central point. Spilled mercury can then be collected and returned to stock.

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DELIVERS PROVED ECONOMY-OF-USE IN CHEMICAL-RESISTANT INDUSTRIAL CLOTHING

Pour on the use and the abuse—DYNEL can take it. It's virtually unaffected by acids, alkalies and strong detergents. Stubbornly resists wear, corrosive fumes, commercial launderings. Available now in a new variety of weights, weaves and anti-static finishes. To discover the savings Dynel offers you, fill out the coupon and mail today.

UNION CARBIDE

TEXTILE FIBERS

Textile Fibers Department, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 100 East 42nd Street, New York 17, N. Y. Offices in Boston, Mass. at 300 First Ave., Needham Heights; Charlotte, N.C. at 1213 Liberty Life Bldg. In Canada, Union Carbide Canada Limited, Montreal, Que., Toronto, Ont. "Union Carbide" and "Dynel" are trademarks of Union Carbide Corporation.

Union Carbide Textile Fibers, Dept. NAT
100 East 42nd St., New York 17, N. Y.

Please send me: information on chemical-resistant clothing designed for (describe type of work)

_____

Name_____

Address_____

City_____ Zone____ State_____

Women Are on the Job

ONE OF EVERY three workers in the country is a woman. And more than a fifth of all working women are in manufacturing industries. Here, in factory offices and on production lines they make up a fourth of all manufacturing employees in the nation.

Women workers are not only needed but numerous and will probably form more than half of the 10 million additional employees predicted for 1965. What's more, they're versatile, actively working in the 446 occupations listed in the latest (1950) census.

Yet, as part of this country's labor force, women have relatively the same safety requirements and obligations as their male colleagues.

Most women excel in routine, repetitive operations and work needing finger or hand skill, assembling small parts, inspecting, packing, work requiring alertness and care, or the use of light instruments.

A firm's medical department should know job requirements such as these to find whether a woman applicant has the physical and mental qualifications. Factors involve:

1. Skill and knowledge required.
2. Physical exertion necessary.
3. Operation hazards, exposure to moving machinery.
4. Amount of sitting and standing.
5. Contacts with toxic dusts, fumes, and odors.
6. Finger dexterity, vision, whether working alone or with others.

To help industry in placement of women, the Women's Bureau of the U. S. Department of Labor has assembled and made data available. State regulations concerning working women are available from state labor departments.

Work Garments

Special clothing is required by women to reduce fatigue, to improve morale, and to keep the product clean. Primarily, special garments are needed to protect them from being caught in moving machinery; from the hazards of dusts, gases, fumes, or acids; from flammable materials; from flying and dropped objects; from material on floors; and from ordinary dust and dirt.

Women need the same safety features in protective clothing and equipment as men, but appearance and fit are especially important to female employees.

Educational campaigns, exhibits of uniforms, head coverings, and other safe clothing will help. Suppliers recognize women's awareness of style and offer clothing and equipment to meet this need.

Clothing for women should be comfortable in any temperature, appropriate for the job, and attractive. Suitable dresses, uniforms and smocks are available. Where skirts are a hazard, slacks and coveralls are used. Fit of the garment is important, since tight-fitting clothing

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safety clear and

free of fog!

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Jobber Inquiries Invited

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Holcomb Protection has set the standard for heat resistant safety garments for over 50 years. Made in asbestos—leather—fireproofed duck our products are performance-proved. They include

*Gloves	*Sleeves	*Foundry Leggings	*Jumper Suits
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Flexiprene*

Neoprene gloves so flexible you can play the piano

Neoprene gloves for protecting workers against chemicals, oils, greases and abrasion used to be awkward—stiff and bulky. Then Hood research men went to work on the problem. They developed a new way to coat soft cotton jersey with neoprene rubber. The result: "Flexiprene" gloves—the most flexible neoprene work gloves ever made—so flexible you can even wear them while playing a piano.

Even though the Flexiprene glove feels lighter and is more flexible, it gives as much protection against chemicals, oils, greases and abrasion as the old "heavyweight" neoprene gloves. Hood's Flexiprene comes in the regular knit wrist style (F-400), and in 12" (F-401) and 14" (F-402) gauntlet styles.

Improvements like those made in the Hood Flexiprene glove can be found in other industrial gloves of the Hood line, which includes latex gloves, and gloves coated with neoprene, rubber or Koroseal. Remember, in gloves the name Hood is a *sure* sign they're good. For more information, call your Hood distributor or contact *Hood Industrial Gloves, Dept. N, Watertown 72, Massachusetts.*

HOOD ***industrial gloves***

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will cause strain, increase fatigue and hamper movement.

Outer garments should avoid loose sleeves, tails, full skirts, flounces, ties, lapels and cuffs. No loose-fitting open sweaters should be worn. Jewelry also can be a danger.

Head and hair protection. Caps with stiff visors, hair nets, and ventilated turbans are available to protect hair from catching in moving belts, spindles, and other moving machinery and equipment.

Paper caps are used in food plants to protect the hair and scalp from dust or to keep foreign material out of the product. These caps are usually provided by management and are changed frequently.

Gloves should fit snugly under the sleeves and should not be awkward to handle. Sleeves should reach from the wrist to the armpit and should be fastened at both ends. They should fit over the gloves and should be roomy enough to allow for flexing the elbows without sliding up and down the arm.

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SAFETY
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Buhrke craftsmen are creating outstanding safety equipment to fit your need . . . and are constantly improving our safety equipment to insure your safety.
• After engaging the D-Ring any twisting or reverse movement of such Ring has a tendency to tighten and lock the guard in position, therefore, giving a more positive locking action
• Virtually impossible to get a false engagement of D-Ring into Snap. Any engagement of D-Ring into throat of Snap will automatically lock the Ring into position with the slightest amount of body pressure.
• Line of force is directly on the line of pull, which eliminates any side deflection and, in turn, increases the safety factor over the old types and styles of Snaps.
• Lever on guard is serrated to eliminate sliding of gloved hands or fingers.
For positive climbing protection • R. H. BUHRKE CO. • Chicago 7, Illinois

Goggles or face shields should be worn when necessary, and maintained in good condition.

Aprons should be full and should cover the front of the body from well below the knee to the neck. They should be fastened around the neck and waist without loose ends.

Shoes. Women's work shoes should be adequate in weight, comfortable and well-fitting—and equipped with steel toes where hazards so indicate. They should have low or medium heels—no open toes or sling-back heels. High heels on the job should be discouraged, since women usually are more susceptible to falls than men. Shoes should provide proper support.

Stockings. Right size reduces pressure and fatigue. Cotton stockings are required in certain hazardous locations, such as hospital operating rooms, where synthetic textiles may cause static sparks.

Sanitary facilities. Clean, adequate toilet facilities and drinking water are important, as are properly equipped rest rooms, locker rooms and showers. Good seating facilities, couches, and mirrors should be provided.

Proper ventilation, heating and lighting preserve health, reduce strain and fatigue.

Lunchrooms with nourishing food at reasonable prices should be provided, when practicable.

Work and pregnancy. Pregnant women should not be employed in jobs involving heavy lifting or other heavy work or in jobs that require continuous standing and moving. As for any woman worker, mechanical aids for lifting weights are appropriate.

Other work taboos for pregnant women include occupations requiring a good sense of bodily balance (work on scaffolds or stepladders), and operation of power-driven machines having a point-of-operation hazard.

Evidence indicates non-pregnant women are no more susceptible than men to industrial poisons. But some toxic substances are considered extra hazardous during pregnancy.

The Women's Bureau of the U.S. Department of Labor offers these recommendations for the successful

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placement of women in industry:

1. Survey jobs to find those suitable for women.
2. Adapt jobs to fit womens' smaller body frames and lesser physical strength (about 60 per cent the strength of men.)
3. Provide service facilities to accommodate the anticipated number of women.
4. If the number of women employed justifies it, appoint a woman personnel director and the head of a womens' counselor system.
5. Develop a program for induction and training.
6. Maintain safe, healthful, pleasant working conditions.
7. Give women equal opportunity with men.

Where conditions and equipment can be adjusted to make a woman worker's job safer and more productive, do so.

1. Guards should be set close enough that the woman's smaller hands cannot enter the openings.
2. Height of benches, distances away from piece parts, and foot pedals or hand controls should be reset to conform to the generally shorter stature and reach of women.
3. Extension of levers on machines, tools, and equipment to produce the same force with less effort.
4. Use of lighter, longer wrenches to reduce strain on operators.
5. Suspension and counterbalancing of heavy hand tools where substitution of lighter tools is impractical.

Seating is important, especially in arranging to have workers alternate sitting and standing. This procedure—where muscular work is involved—has resulted in increasing output from 2 to 13 per cent.

Suitable seats should be made available in adequate numbers, with workers free to use them at any time, if the job permits—and in any event when not engaged in work that requires standing.

Protection for Electrical Workers

Special tools and protective equipment have been developed for linemen and generating station employees. Operating conditions vary but certain items are standard.

Tools used near energized equipment should be designed for the job and insulated to minimize the danger of shock to the operator. Insulation on tools alone, however, is not adequate protection near high voltages.*

Items in common use include:

Linemens' rubber gloves
Leather protector gloves
Rubber line hose and blankets
Linemens' belts and safety straps
Climbers
Rubber coats
Tool pouches
Tool buckets
Fuse pullers
Switch sticks
Insulated stools
Switchboard mats

Protective hats of insulating plastic or fiberglass are becoming standard equipment for linemen.

Regular and thorough inspections should be provided for all protective equipment. Defective items should be replaced immediately.

Brooms, brushes, and other cleaning equipment used around energized equipment should be free

For SAFETY

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Fyrepel can fabricate into any size or shape desired—curtains can be hung or removed in seconds. Personnel can easily push it aside or pass under with ease if necessary. High heat operations that affect the work of personnel or mechanical controls can be easily isolated and controlled. In heat treating or repairs to equipment where the retention of heat is essential, this material has particular appeal. Why not consult us now on your particular problem. We have at least a partial answer to most high heat problems. Write, wire or phone

FYREPEL PRODUCTS INC., Box 503, Dept. N, NEWARK, OHIO

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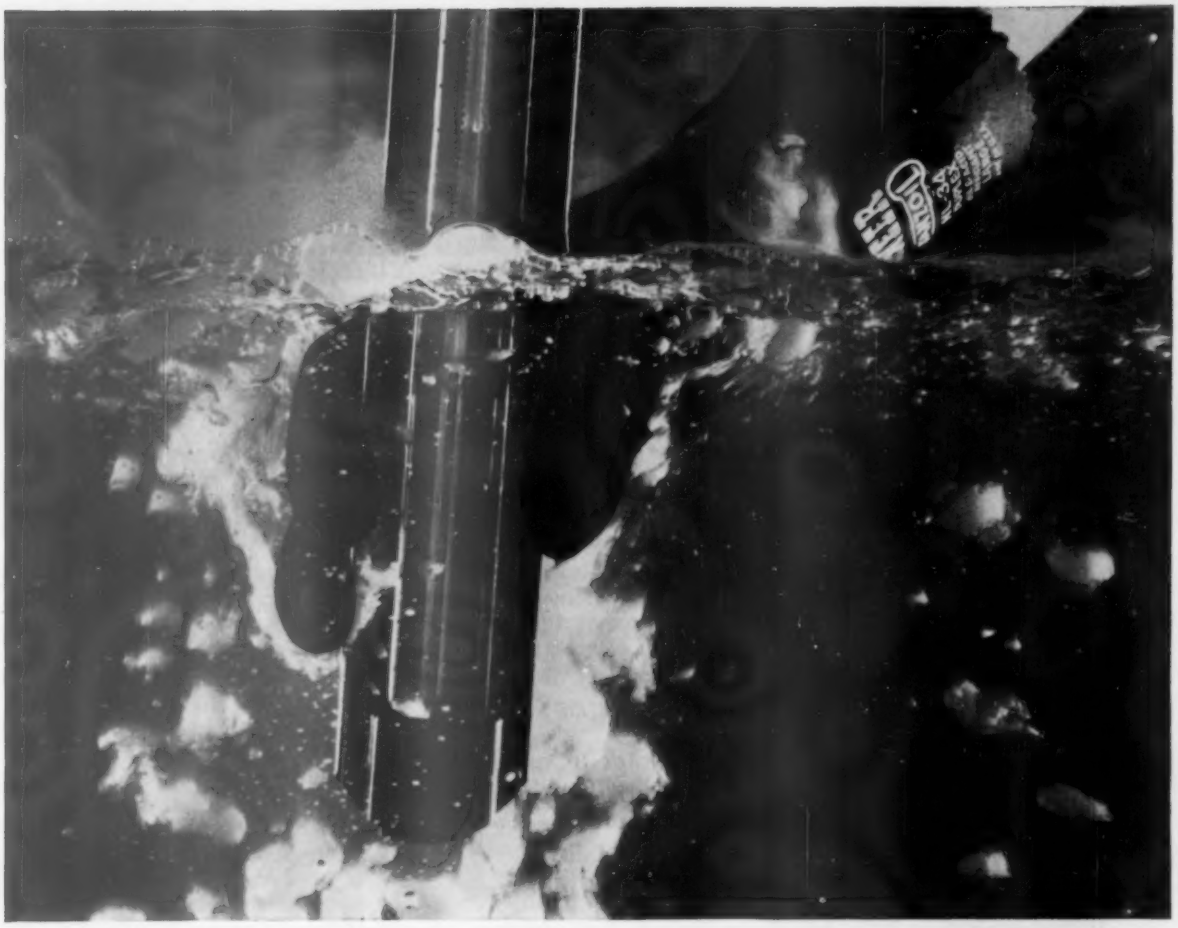
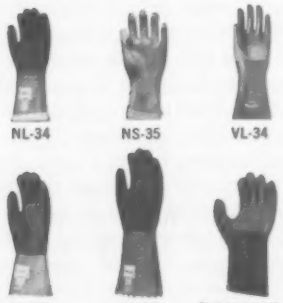


When Temperature Protection is Vital, Specify PIONEER



These liquidproof gloves with non-slip grip protect hands from hot and cold temperatures and reduce hand fatigue:

Style No.	Temperature Protection	Glove Material
Hand and Wrist Protection		
NL-34	Moderate	Knit Lined Neoprene
VL-34	Moderate	Knit Lined Pylox
NS-35	(Sheer Comfort)	Flock Lined Neoprene
Hand, Wrist and Forearm Protection		
NL-42	Moderate	Knit Lined Neoprene
NL-52	Moderate	Knit Lined Neoprene
225 Hot 'N Cold	Extreme	Twin Lined Neoprene Coated Flannel

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Helps you solve many hand protection problems — whether they involve chemicals, abrasion resistance, worker fatigue, extreme hot and cold temperature, or products that must be protected from hands! Eliminates costly errors in glove selection.

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Gives you these outstanding advantages:

- **Resistant to most acids and alkalis**
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- **Lightweight—only 14 ozs.**

Here is a protective suit specially designed to provide wearer protection in a wide variety of industrial operations involving exposure to chemicals, water, and excess dust or dirt. Made of inexpensive polyvinyl chloride plastic, it fills the need for a disposable protective suit at a *fraction* of the usual cost.

Slip-over jacket and trousers are generously proportioned for comfortable fit over ordinary work clothing. Elastic tape at neck, wrists and ankles insures tight fit for additional protection against dust, sprays and splashes.

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from metal. Insulating handles of tools should be kept clean and dry and only nonconducting preservatives used on them.

Metal ladders should not be used around electrical equipment.

In emergencies where areas are wet, wood platforms or insulated stools should be used or rubber boots should be worn by maintenance workers.

What Uniforms Will Do

Centuries ago the armed services found that putting men in uniform added team spirit to a group and increased their effectiveness as a fighting unit. The idea spread to civilian activities, and uniforms are now worn by transportation and service employees whose duties bring them in contact with the public. A neat, well-fitted uniform with the company's identifying symbol makes a good impression on the public and stimulates the employee to live up to it.

Uniforms are being worn increasingly by factory employees. Most workers like them—particularly when the company pays all or part of the original cost and upkeep. Managements who supply them feel they bring greater cleanliness, health and safety, and increased efficiency, as well as improved morale and public relations. Uniforms also enable management to exercise greater control over what employees wear at work, thereby eliminating many a dirty and unsafe garment.

Even women, who at first offered the most opposition to uniforms, have been largely won over. Cleanliness, of course, has a strong appeal to them, and improved styling and fitting have lessened resistance. It does away with the possible problems and hazards created when one woman employee wears more expensive clothes than another.

Companies which stress quality control and special sanitary precautions in processing and packing invariably provide uniforms to plant workers. Food packers are an outstanding example of this group, and the sight of employees in clean, trim uniforms makes a good impression on visitors.

Companies which manufacture or handle toxic materials follow similar practices in providing uniforms.

Who wears them? Uniforms are usually worn by product and plant inspectors, laboratory workers, maintenance men, nurses, plant matrons, engineers and employees in receiving, stock and toolrooms. Girls riding bicycles or scooters around the plant are usually required to wear slacks. Uniforms are frequently issued for particularly dirty jobs, even where the health and public relations angles are relatively minor.

Uniform rental plans are offered by industrial launderers in many cities. Uniforms are furnished, cleaned and kept in repair by the laundry. Each new garment is measured to fit the wearer and replaced at definite intervals, even though not worn out. Each garment is marked with the wearer's name and may carry the company name and emblem. * * *

Better Conditions on The Night Shift

NIGHT WORK generally is regarded as a necessary evil by both management and employees. An occasional person may prefer the night shift for personal reasons.

Most workers resent it because it upsets their natural habits of sleeping and eating and interferes with family and social life. The small extra pay for night work does not compensate for its disadvantages.

Rotation of shifts is followed in most companies which operate multiple shifts.

Most employees realize that taking their turn on the night shift is necessary but they feel that management could improve working conditions.

With modern lighting systems, illumination of work places is maintained at the same level day and night for most operations. Food service, first-aid facilities, and transportation are conspicuous among the difficulties.

Food service. When the full force is not maintained at night, the cost of operating the cafeteria may be excessive. Workers often bring their own food, not always a balanced meal, and supplement it with a soft drink from the vending machine. Unbalanced meals, along with the change of living habits, is said to cause a high percentage of digestive troubles among night workers.

Some plants have facilities for making coffee, with the company supplying the gas or electric plate. Others have rolling canteens.

Vending machines supply milk and hot beverages and some machines dispense hot foods.

Box lunch services are available at all hours in some localities, and neighborhood diners and restaurants send in food and coffee on order.

Medical care. Adequate medical care at night is another problem, especially when a small force is employed. Where night operations are on a large scale, nurses and doctors are often on duty.

Where this is not practicable, first-aid service must be given by trained laymen, frequently the plant guards. Sometimes a doctor visits the plant at night to check the first-aid facilities and give physical examinations.

Transportation. Infrequent bus service at night is a common problem. For many employees car pools are a solution but not all employees can take advantage of them. Sometimes management is able to make some arrangement with the transportation company by guaranteeing a minimum number of riders.

Special routes for buses may be arranged if a number of workers are living in certain areas. This is appreciated by women on night duty who, with good reason, are afraid to go home alone. When women have to work beyond their regular shift, some companies pay their taxi fare. * * *

Combustibility of Fabrics

Acetate. Ignites readily, melts and burns quickly but somewhat less so than rayon or cotton.

Acrilan. Ignites readily, melts and burns like cotton.

Cotton. Burns rather rapidly.

Dacron. Ignites with difficulty, melts and burns slowly.

Dynel. Difficult to ignite, melts but does not support combustion.

Nylon. Quite difficult to ignite, melts but does not support combustion.

Orlon. Ignites readily, melts and burns like cotton.

Polyethylene. Melts and burns very slowly.

Rayon. Ignites readily and burns rather rapidly.

Saran. Ignites with moderate difficulty, self-extinguishing, melts but does not burn.

Vicara. Burns rather easily but less flammable than rayon and cotton.

Vinyon & Vinyon N. Difficult to ignite, melts but does not support combustion.

Wood. Difficult to ignite, tends to be self-extinguishing.

Clean Up After Work in Corrosive Atmospheres

When personal protective equipment is worn in a corrosive atmosphere, set up a rigid procedure for care of it after use to prevent contact with contaminated parts.

Before removal, even though it has not come in contact with corrosive chemicals, wash equipment thoroughly with a hose stream.

Remove boots, coats, aprons, and hats—then gloves. This is the logical order of removal if the coat has been put on properly with the sleeves outside the cuffs of the gloves.

Wash hands thoroughly before removing face shield and goggles. Then wash hands and face thoroughly again. A shower and change of clothing are better.

References—Protection for Feet, Hands, Arms, Legs, Body

National Safety Council

Accident Prevention Manual for Industrial Operations, 1959.

National Safety News

Good Customers for the Shoe Business; Oct. 1952.

Happy Feet; June 1955.

Safety Belts and the Men Who Wear Them; Sept. 1956.

Ten Reasons for Hand Protection; Apr. 1957.

What They Wear Keeps Them Safe; Merrick Pratt, May 1957.

The Glove with a Hundred Uses; Draper Allen; Sept. 1957.

Haberdashery for Hot Jobs; July 1958.

How the Navy Protects Its Feet; Alan Turnbull, July 1958.

Tailored for Safety; Oct. 1958.

Looking Over the Plastics; Donald H. Yarnall, Oct. 1958.

The Convincing Case for Safety Shoes; Clifford F. Burris, Dec. 1959.

Ten-Finger Safety; Thomas H. Bullard, Dec. 1959.

They're Learning to Use Seat Belts; Murray D. Segal, Jan. 1960.

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Moreover, Jomac gloves *wear longer* than leather gloves and provide a *better grip* on oily surfaces. And most Jomacs—like the HR gloves shown above—are reversible . . . so any two make a pair, any pair gives you four working surfaces.

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COMING EVENTS

in safety and related fields.

Mar. 9-10, Philadelphia, Pa.
Twenty-sixth Annual Regional Safety and Fire Conference and Exhibit. (Bellevue-Stratford Hotel). Harry H. Verdier, executive director, Safety Council, Chamber of Commerce of Greater Philadelphia, 121 S. Broad St., Philadelphia 7, Pa.

Mar. 15, 22, 29, Baltimore, Md.
Fourth Annual Occupational Safety Seminar (Eastern High School). Earl W. Smith, managing director, Baltimore Safety Council, 1511 Guilford Ave., Baltimore 2, Md.

Mar. 15-16, Fort Wayne, Ind.
1960 Northeastern Indiana Safety Conference and Exhibit. Ivan A. Martin, manager, Safety Council, Chamber of Commerce of Fort Wayne, Ind.

Mar. 16, 23, 30, New Haven, Conn.
Second Annual Supervisors' Safety Training Course (Hillhouse High School). Albert L. Phillips, executive director, Greater New Haven Safety Council, 152 Temple St., New Haven 10, Conn.

Mar. 21-22, Boston, Mass.
Thirty-ninth Annual Massachusetts Safety Conference and Exhibit. (Hotel Statler Hilton). Bert Harmon, manager, Massachusetts Safety Council, 54 Devonshire St., Boston 9.

Mar. 23, Madison, Wis.
Wisconsin Canners Safety Institute, R. W. Gillette, executive director, Wisconsin Council of Safety, Inc., 1 West Wilson St., Madison, Wis.

Mar. 27-30, Dallas, Tex.
Annual Texas Safety Conference (Adolphus Hotel). J. O. Musick, general manager, Texas Safety Association, Inc., 830 Littlefield Bldg., Austin, Tex.

Mar. 28-April 1, New York City
Thirtieth Annual Safety Convention and Exposition of Greater New York Safety Council. Paul F. Stricker, Greater New York Safety Council,

Lincoln Bldg., 60 E. 42nd St., New York 17, N. Y.

Mar. 29-30, Oakland, Calif.

Eighth Annual Northern California Safety Congress and Exhibits (Hotel Claremont). Clinton W. Dreyer, Eastbay Chapter, NSC, 1322 Webster St., Oakland 12, Calif.

Mar. 29-31, Lafayette, Ind.

Seventh Annual Industrial Fire Control Conference (Purdue University). Prof. Shelby Gallien, seminar director, Public Safety Institute, Purdue University, Lafayette, Ind.

April 4-5, Toronto, Canada

Industrial Accident Prevention Associations Annual Conference (Royal York Hotel). R. G. D. Anderson, general manager, IAPA, 90 Harbour St., Toronto 1, Ont., Canada.

April 5-7, Pittsburgh, Pa.

Thirty-fifth Annual Western Pennsylvania Safety Engineering Conference and Exhibit (Pittsburgh Hilton Hotel). Harry H. Brainerd, executive manager, Western Pennsylvania Safety Council, 305 First Federal Building, 600 Grant St., Pittsburgh 19, Pa.

April 11-13, Los Angeles, Calif.

Seventh Annual Western Safety Congress and Exhibits (Ambassador Hotel). Joseph M. Kaplan, manager, Greater Los Angeles Chapter—National Safety Council, 3388 W. 8th St., Los Angeles 5, Calif.

April 12-14, Detroit, Mich.

Michigan State Safety Conference. (Sheraton Cadillac Hotel). Ben Duguid, c/o All State Insurance Company, Box 5300—Seven Oaks Station, 16130 Northland Dr., Detroit 35, Mich.

April 12-14, Buffalo, N. Y.

Twentieth Western New York Safety Conference and Exhibit (Hotel Statler-Hilton). Clifford H. Seymour, Western New York Safety Conference, Box 315, Niagara Falls, N. Y.

April 19-21, Columbus, Ohio

Thirtieth All-Ohio Safety Congress and Exhibit (Neil House). Arthur W. Moon, Congress manager, Third Floor, 400 S. Front St., Columbus 15, Ohio.

April 27-28, Indianapolis, Ind.

Thirteenth Central Indiana Safety Conference and Exhibit (Claypool Hotel). Jack E. Gunnell, Indianapolis Chamber of Commerce Safety Council, 320 N. Meridian St., Indianapolis 11, Ind.

April 27-29, Gainesville, Fla.

Seventh Annual Conference on Accident Prevention Engineering. (University of Florida). Donald B. Wilcox, conference coordinator, U. of Florida, College of Engineering, Gainesville, Fla.

May 2-4, Bethlehem, Pa.

Thirty-third Annual Eastern Pennsylvania Safety Conference (Hotel Bethlehem). Harold A. Seward, secretary-treasurer, Lehigh Valley Safety Council, 602 East Third St., Bethlehem, Pa.

May 4-6, Winston-Salem, N. C.

Thirtieth Annual North Carolina Statewide Industrial Safety Conference (Robert E. Lee Hotel). H. S. Baucom, director of safety, North Carolina Industrial Commission, Raleigh, N. C.

May 5, Watertown, Wis.

Rock River Valley Conference. R. W. Gillette, executive director, Wisconsin Council of Safety, Inc., 1 West Wilson St., Madison, Wis.

May 5-7, Richmond, Va.

Twenty-sixth Annual Conference of the Virginia Safety Association. (Hotel John Marshall). Hiram M. Smith, Jr., Virginia Safety Association, 2501 Monument Ave., Richmond 20, Va.

May 17-18, Omaha, Neb.

Executive Committee, Public Utilities Section, NSC, (Sheraton-Fontennelle Hotel). E. Dunbar, 929 E. St. N.W., Washington, D. C.

June 9, Rhinelander, Wis.

Wisconsin River Valley Conference. R. W. Gillette, executive director, Wisconsin Council of Safety, Inc., 1 West Wilson St., Madison, Wis.

June 16, Oshkosh, Wis.

Fox River Valley and Lakeshore Conferences, R. W. Gillette, executive director, Wisconsin Council of Safety, Inc., 1 West Wilson St., Madison, Wis.

June 19-22, Ithaca, N.Y.

Seventh National Conference on Campus Safety (Cornell University). Francis J. Quinlan, Campus Safety Association, c/o Division of Safety, Cornell University, Ithaca, N.Y.

Oct. 17-21, Chicago.

Forty-eighth National Safety Congress and Exposition (Conrad-Hilton Hotel). R. L. Forney, secretary, National Safety Council, 425 N. Michigan Ave., Chicago 11.

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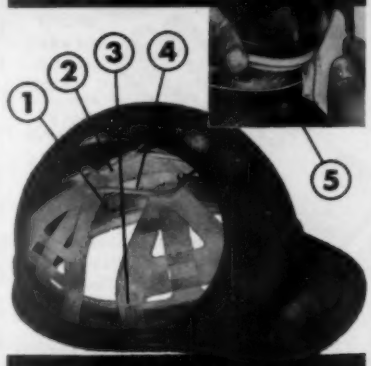

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3. suspension removed or replaced with snap-in "i-slots".
4. lace for comfortable crown adjustment.
5. plastic-zippered sweatband removes swiftly with pullout motion, easily and rapidly replaced.

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Apex fibre-glass hats and caps are manufactured with a new resin-glass formula providing the greatest structural strength ever achieved in safety hats . . . the *Apex* aluminum line is the equal to fibre-glass in light weight and comfort, and adds the advantage of heat reflection . . . electrical line is molded of highly resilient linear polyethylene.

All three lines are free of maintenance and corrosion, and all three exceed standards for hard hat safety.

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Industrial Safety Research

—*From page 6*

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SECTION 7

MATERIALS HANDLING

IN SECTION 7:

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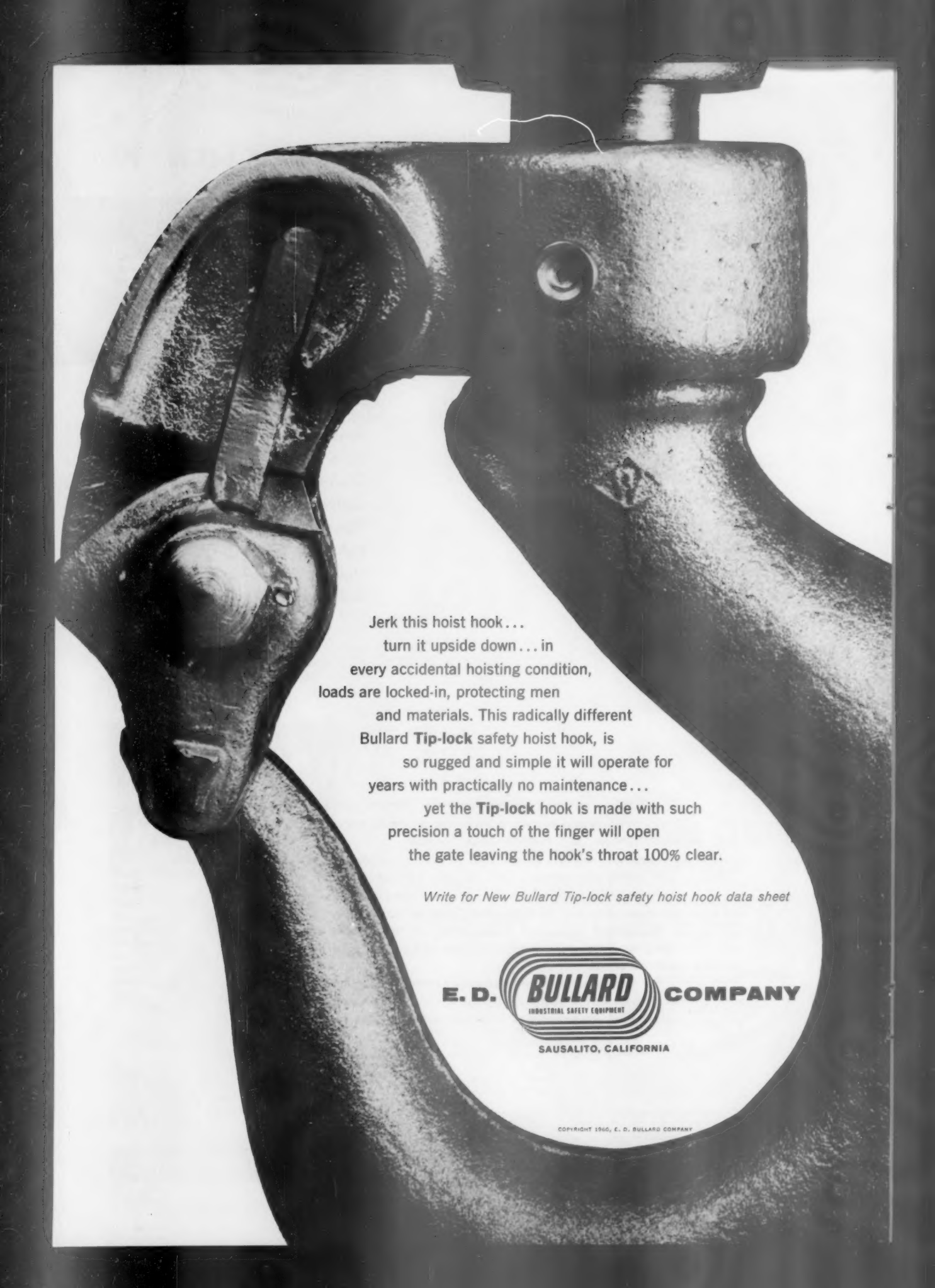
BETWEEN farm, forest, or mine and the ultimate consumer, every product is handled many times—by the producer, processor, wholesaler, retailer, and transportation agencies.

Materials handling is one field in which operating departments and safety departments have a very obvious common interest. Both are trying to cut down the number of handling operations, both for lower costs and for reduced exposure to accident.

Mechanical equipment avoids many of the hazards of manual handling, largely reducing the exposure and preventing strains, blows, and abrasions.

But mechanization introduces some new hazards. To use mechanical equipment safely, study plant processes and handling methods. Then select your equipment and train men in its safe use.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Fundamentals of Handling

Organization, equipment and men

EVERY TIME a worker picks up a load, puts it down, or moves it in any combination of horizontal-vertical planes, he is exposed to accident risks. From the standpoint of both operating efficiency and safety, it is desirable to cut down the number of times an object is handled.

Mechanical handling methods prevent many strains, sprains, and back injuries but often introduce other hazards. Training of operators and maintenance of equipment are important.

Where manual handling is necessary, men should be trained in the safest and easiest methods. Their fitness should be determined by preplacement examinations and job studies.

Manual Handling

When an object is to be handled manually, its weight, height to be lifted, and distance to be traveled are important factors. Operating conditions may bring exposures that cannot always be predicted.

Exposures. Simple equipment is often needed for manual lifting and transporting. Training, supervision, and housekeeping will help control these:

1. Incorrect methods of lifting and carrying.
2. Attempt to lift weights beyond the worker's capacity.
3. Lack of coordination when men lift together.
4. Cluttered aisles, floors, or stairs.
5. Failure to use equipment.
6. Showing off.

Mechanized Handling

When mechanical power lifts and propels the weight, height to be lifted and distance to be traveled are the important factors. The greater the distance traveled with the load, the greater the chance of dropping it or colliding with another object.

Exposures. Mechanized handling equipment also poses safety problems. When such devices are used, strains are minimized but falling object and collision accidents (with crushed hands and feet) may increase significantly.

Injuries from operation of mechanical devices may usually be traced to:

1. Objects falling from carrier.
2. Inadequate training of operators.
3. Faulty plant layout.
4. Horseplay.
5. Devices inadequate for the job.
6. Failure to use available equipment.
7. Poor housekeeping.
8. Excess handling between operations.

Organization for Handling

Purchase of an industrial truck or a handling device is not sufficient to bring any significant reduction in accident frequency. An organized plan should cover:

1. Study of accident occurrence.
2. Determination of location and types of accidents.
3. Inspection of conditions and study of causes of accidents.
4. Correlation of accident data and inspection findings.
5. Preparation of management report.

Basic Equipment for Handling Materials

TWO FACTORS will decide the methods of handling materials and the equipment used.

1. Does material move in more or less continuous flow and in fixed paths? Operation will then require such equipment as conveyors, traveling cranes, railroads and elevators.

2. Are goods moved intermittently between many points in plant and yard? This is the more common situation in industry and many types of portable handling equipment permit flexibility in handling operations.

Portable equipment, hand and power operated, is needed in every plant. In the smaller shops it may serve all needs. In larger plants these devices are useful auxiliaries to fixed systems.

This section is concerned chiefly with the more common portable devices, including:

1. Wheelbarrows.
2. Hand trucks.
3. Hand lift trucks.
4. Powered hand trucks.
5. Industrial power trucks.
6. Tractors and trailers.
7. Hoists.
8. Cranes.
9. Conveyors.
10. Slings—wire rope, chain, fiber rope, and accessories.
11. Miscellaneous equipment—skids, pallets, tote boxes, dollies, clamps, dock boards, crossover bridges.

Load-Bearing Parts

Wire rope, chain, and fiber rope are important wherever loads are lifted or hauled. These products are built to meet exacting specifications, and their capacities are listed according to size, material and type of construction.

Slings made of these materials and attachments, such as hooks, and rings, are designed to meet the needs of every hoisting job.

These parts are subjected regularly to heavy loads, sometimes

---

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overloads. They should be selected for the needs of the job and kept serviceable by regular inspection and maintenance.

Unit Loading

Assembly of loads on skids, pallets or trailers to be moved from one part of the plant to another means less handling and more pieces per each handling. To move the load, it is only necessary for the truck to slide the platform or fork under the skid or pallet or to hook a tractor to the trailer.

A skid is a platform elevated from the floor by legs, casters, or special attachments.

A pallet is a development of the platform skid. The most common type is the double-faced wooden pallet with sufficient clearance between top and bottom to insert the forks of a fork truck for moving.

Clamps of various types add to the usefulness of fork trucks. These can move and pile drums, bales, and cartons without use of pallets.

Steel strapping provides a secure method of fastening bundled materials and for reinforcing packing cases. Workers need training in application and removal, and should wear goggles and leather palm gloves for the work. Equipment available from suppliers should be used for applying and removing strapping. * * *

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Wire Rope and Slings

Wire rope slings are made in sizes for every hoisting job.

WIRE ROPE has high tensile strength and moderate flexibility and is resistant to varying weather conditions. It is available in grades, constructions, and sizes to meet industrial requirements for lifting and haulage.

In spite of its strength and ruggedness, wire rope needs careful handling and maintenance for long, safe service. It should not be exposed to excessive heat or corrosive substances nor dragged over rough surfaces.

In selecting wire rope, consider these factors:

1. Size.
2. Construction.
3. Grade.
4. Equipment on which rope is to be used, conditions of service.
5. Handling, installation, and maintenance.

Every user of wire rope should have a file of catalogs of the leading manufacturers. In addition to listing types available, these give much useful information on use and maintenance.

Constructions

There are many types of construction, each with its own particular advantages for certain service conditions.

In describing construction, the first numeral indicates the number of strands in the rope; the second, the number of wires in each strand.

This is followed by a term describing the geometric arrangements of wires in each strand, such as 6 x 19 Filler Wire.

The 6 x 19 construction is the most generally useful. As the number of wires per strand increases, flexibility and reserve strength increase, but ability to withstand abrasion decreases. A 6 x 7 construction has higher resistance to abrasion but less flexibility.

The core serves as a foundation for the strands. Three types of cores are used: (1) fiber (2) independent wire rope and (3) wire strand.

Fiber gives elasticity to the rope and has adequate strength for normal operating conditions.

Metal cores are used where maximum strength and minimum stretch are important; where heavy loads or overwinding on a drum causes excessive pressure of strands against the core, or where temperature would dry out a fiber core.

Type of lay. There are two general methods of laying up rope:

1. *Regular lay.* Wires in the strand are laid in the opposite direc-

tion to that of the strands in the rope, so that on the outside of the rope the wires lay approximately parallel to the rope axis. Regular lay is standard. It is easier to handle during installation and is less susceptible to kinking.

Lang lay. Wires and strands are laid to the same direction. It has flexibility and fatigue resistance.

Herringbone is fabricated of 2 pairs of Lang lay strands separated by 2 strands of regular lay. This new construction is said to combine the flexibility and abrasion-resistant characteristics of Lang lay rope with the structural stability of regular lay. At present herringbone ropes are of the 6 x 37 construction and are preformed.

Wire rope is made either right or left lay. In most cases it makes little or no difference which type is used. Right lay is standard.

Rope Grades

Rope wires usually are made of the following materials and designated by their names (Minimum tensile strengths are quoted from Federal Specifications RR-571a):

Improved plow steel. Has highest strength and toughness and most wear-resistant properties. Most frequently selected for heavy-duty service, as in deep shafts and on excavating machinery. Minimum tensile strengths, 218,000-244,000 psi.

Plow steel. Strength about 15 per cent less than improved plow steel. Serviceable for haulage, hoisting, logging, and miscellaneous service. Minimum tensile strengths, 190,000-212,000 psi.

Mild plow steel. Combines toughness with pliability, making it capable of undergoing repeated impact stresses. Used principally for cable tool drilling. Minimum tensile strengths, 165,000-184,000 psi.

Cast steel. Where strength is not the controlling factor, its pliability is important to long life. Resistant to acid mine water.

Traction steel. Used in hoisting ropes for traction-type elevators. High resistance to bending fatigue and minimum abrasive action on

—*To page 198*

Chains and Slings

CHAIN SLINGS are workhorses for industry. They combine strength, flexibility, and resistance to heat, impact, and corrosion. This versatility allows a range of uses from light hand hoists to huge cranes that can pick up heavy machinery.

For almost every hoisting and hauling effort, there's a chain, and attachments suitable for many projects can be obtained, or complete slings may be purchased.

Specifications for various types of chain have been compiled by the American Society for Testing Materials. Safe loads may be determined from tables in manufacturers' handbooks.

Safe working load means the maximum load which should be applied to a chain in direct tension.

Breaking loads are of no practical interest to the user. They are often misleading and may encourage unsafe practices.

Proof test means the actual test in pounds applied to the chain and attachments before leaving the factory. Proof-test figures should not be considered safe working loads.

The above tests are followed by visual link-by-link inspection by experienced inspectors.

Chain and braided wire rope slings are used in this heavy-duty hoist. Hooks are equipped with safety catches.

Types of Chain

Conditions under which chain will operate should be considered during selection. When ordering, the manufacturer should be consulted about applications.

Factors to be considered are: impact loading, bumpy craneways, rapid lifts, sudden stops, heat, and corrosive atmospheres.

Types commonly used in industrial operations are:

Wrought iron chain (crane or dredge) has high resistance to shock fatigue and corrosion. This chain has close links and is used for slings, hoists, cranes, power shovels, and marine purposes where human life and property depend on it.

Welded steel chain (low carbon) is made in three common types: Proof Coil, BBB, and Steel Loading.

Proof Coil is used principally for towing, binding, logging, and similar operations. Links are comparatively long. Proof coil chain is not suitable for lifting or for slings.

BBB Coil is a higher grade than proof coil, with safe working load about 25 per cent greater. Shorter links give greater flexibility. BBB coil chain is not suitable for lifting or for slings.

Steel Loading chain has a tensile strength about 50 per cent higher than BBB. It is used in the logging industry for binding and loading logs and in oil fields for handling pipe and heavy equipment.

High-test chain (high carbon) is heat-treated to give it high tensile strength and resistance to impact loads. Tensile strength is almost double that of ordinary steel chain. Ductility is moderate. Where resistance to wear is most important, it permits use of smaller and lighter chain.

Alloy steel chain (general purpose) has exceptional strength for weight and size, is resistant to some types of corrosion, and frequently is used where maximum tensile strength and resistance to abrasion —with reasonable resistance to impact—is required.

Special purpose alloy chain is considerably higher in cost and is used on high-temperature operations and where resistance to corrosive substances is required.

Stainless steel is high in tensile strength, fair in elongation, but low in impact resistance. It is used chiefly for ornamental installations and acid pickling.

Monel has fair tensile and impact strength and elongation. It is resistant to sulfuric and hydrochloric acid solutions but not to nitric.

Bronze has good elongation and fair resistance to impact, but low tensile strength. It is resistant to sulfuric and hydrochloric acid solutions but not to nitric.

Specialized types of chain have been developed for certain industries. Finishes sometimes are added to chains to provide added protection from corrosion or for decorative effect.

Nickel alloy steel hoisting chain is nearly twice as strong as iron chain of the same size. It meets ASTM elongation requirements for iron crane and proof coil chain. It can be used over a wider range of temperature and is relatively immune to failure resulting from fatigue stresses and cold working of the metal.

Impact resistance in heat-treated alloy steel chains does not increase in proportion to the strength of the chain. Under full working load they will fail under impact before a fully loaded wrought iron or heat-treated carbon chain will fail.

Because of wear and impact factors some manufacturers recommend that link size of sling chains should not be greatly reduced when using as compared with wrought iron chain.

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Use and Care

Storage. When not in use, each chain should be hung on a rack or piled neatly on a dry floor or platform where it will not create a tripping hazard. Exposure to corrosive fumes or liquids should be avoided.

Safe loads. Some plants stamp on a metal tag attached to each chain the safe vertical load which may be lifted with the chain. A better way is to stamp the safe load, or a reference number, on the ring or hook.

Stamp marks should not be placed on links where they might form points of weakness.

The useful life of all material-handling equipment, particularly rope and chain, is shortened by overloading, jerking, and neglect.

Chain Slings

Preferably, slings should be purchased complete from the manufacturer. All attachments should be made to proper dimensions and of material specified for various uses.

Rings and **hooks** are as important as the chain and should receive the same attention in inspection and maintenance.

When a sling requires repair, it should be sent to the manufacturer.

A hook bent by overloading should be replaced. The stress of bending weakens metal and its strength cannot be restored. * * *

Conveyors

SYSTEMS of conveyors, planned to fit manufacturing processes, have made mass production possible to a great extent. These conveyors have found use in the assembly of articles, moving parts or materials from one machine operation to the next, moving parts through painting, drying, baking, heat-treating and other processes, and from one floor to another.

Conveyors can operate where it would be dangerous or uncomfortable for men to work. They also eliminate many manual handling operations which present opportunities for injury.

Conveyors are divided into 7 basic types:

1. Roller
2. Belt
3. Chain
4. Cable
5. Monorail
6. Screw
7. Pneumatic

Most operations need power-driven conveyors but gravity conveyors of the chute and roller types can be used effectively where successive operations are conducted on lower floors.

Stile-type crossover bridges with handrails should be placed where needed along the conveyor line.

Overhead conveyors should have side boards along edges and at turns, also screen guards under high runs, to protect workers and equipment from falling material.

Portable conveyors, mounted on wheels or casters, can be moved where needed for short jobs. They are made in roller, belt and bucket types for handling packages and loose materials. They are used in warehouses, docks, shipping platforms, coal yards and sand and gravel pits.

Both power-driven and gravity types are available. The connecting cord should be a 4-conductor in case of 3-phase power, the fourth wire being grounded in all plugs and receptacles. The cable should be arranged so it cannot be run over by vehicles and it should be inspected frequently.

Exhaust Purifiers for Power Trucks

Where trucks powered by internal combustion engines are operated in confined spaces, carbon monoxide is a problem. Use of catalytic exhaust on trucks permits operation indoors where there is good ventilation. Types of exhaust purifiers are available for white (unleaded) gasoline, liquefied petroleum gas, leaded gas, and diesel fuel.

Preventive maintenance of trucks keeps down carbon monoxide in the exhaust. This includes a frequent check of the carburetor, since too rich a mixture can produce excessive quantities of the gas.

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VOL. CI-59

McKAY

SLING CHAIN SAFETY TIPS

ON THE PROPER USE, CARE, INSPECTION OF SLING CHAINS FOR MATERIALS HANDLING

PERIODIC INSPECTIONS DETECT DAMAGE TO CHAIN

For a successful sling chain program, slings and other chain assemblies should be inspected regularly at frequent intervals. Frequency depends upon the amount of use. *All* chains should be inspected at least twice per year.

It is well to clean each chain before inspection to make it easier to detect gouges, nicks, bent links, wear, stretch and other defects.

HOW TO DETERMINE DEGREE OF WEAR IN CHAIN

Normally, wear occurs primarily at the bearing surfaces on the inside ends of the links where the adjoining links are seated. When wear is noticed, separate each link and measure the cross sections at each end. If the wear detected exceeds the allowable maximum shown in the following table, remove the chain from service.

Chain Size	Removal From Service Dimensions*	Chain Size	Removal From Service Dimensions*
¼"	15/64"	1 ¼"	31/32"
5/16"	5/16"	1 ¼"	1 3/32"
⅜"	7/16"	1 ⅜"	1 3/16"
7/16"	17/32"	1 ½"	1 9/32"
½"	21/32"	1 ⅝"	1 ½"
9/16"	¾"	1 ¾"	1 11/16"
⅝"	7/8"	2"	
¾"	1"		

*When smallest section of link is less than these dimensions.

ALLOY CHAIN SHOULD BE RECONDITIONED AT FACTORY

DON'T ANNEAL ALLOY SLING CHAINS

Alloy Sling Chains should never be annealed. They are heat treated to provide high strength and long wear and annealing will damage the effects of the heat treatment. When alloy chain is returned to the manufacturer, it is thoroughly inspected. Damaged areas are replaced with new alloy chain, then entire assembly is heat-treated, proof-tested and returned bearing same specifications as original identification plate indicates.

REDUCE THE LOAD UNDER HIGH HEAT CONDITIONS

In very high heat applications, the working load decreases as the temperature increases, as follows:

Temperature of Chain	Reduction in Working Load Limit* While Heated	Permanent Reduction in Working Load Limits**
500° F	NONE	NONE
600° F	10%	NONE
700° F	20%	NONE
800° F	30%	NONE
900° F	40%	10%
1000° F	50%	15%

*While chain is at temperature in first column.

**While chain is used at room temperature after having been heated to temperature in first column.

STRETCH IN CHAIN CREATES A DANGEROUS CONDITION

The only way a section of a sling chain may become stretched, is overloading.

The links can become elongated by wear or by being crushed. Considering the overall length, the percentage of stretch may be within the allowable limit but a dangerous condition exists when individual links become elongated.

The most satisfactory method for detecting stretch is through a visual link by link inspection. A link of uniform appearance which hinges freely with other links is suitable for further use. The slightest indication of binding at the bearing points of the links means the sides may have collapsed due to stretch. Such a chain is unfit and should be repaired or replaced.

SAFE LIFTING PROCEDURES

1. Inspect chain for defects
2. Select chain with suitable load strength
3. Pad sharp edges and corners
4. Don't lift unbalanced loads without adjuster
5. Don't jerk or shock
6. Don't allow load to rest on chain
7. Use shortener to shorten chain length
8. Don't force hook into chain by hammering
9. Stand clear during lift
10. Watch for kinks and twists

NEW SAFETY KIT

This new 5 part kit, totaling 38 pages, is a complete guide on how to Use, Inspect, Maintain Sling Chains for Maximum Safety and Economy. Send for your copy today.

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Fiber Rope

Natural and synthetic

ROPE made of fiber, natural or synthetic, is flexible, easy to tie and splice and handle manually. These properties, along with good strength and resistance to weather, are essential for block and tackle, slings, suspended scaffolds, and marine operations.

For centuries, men have used rope of natural fibers for hoisting and haulage. Now synthetic fibers are being used increasingly as rope material.

Natural Fibers

Manila is the best natural fiber for cordage, especially for large ropes. It has the highest strength and is recommended for slings. High-grade manila rope is firm but pliant. When new, it is ivory to light yellow in color and has considerable luster. When drawn through the hand, it has a smooth feel.

Sisal is an inferior fiber, used chiefly for smaller ropes. Its strength is 65 to 80 per cent of manila. Fibers are stiff and tend to splinter.

Synthetic Fibers

Nylon has about 1½ times the breaking strength of manila rope and about 4 times its elasticity. It is particularly suitable for shock loading as required by safety lines.

When wet or frozen, loss of strength is relatively small. Resistance to abrasion is higher than that of hard fiber ropes. It is also highly resistant to mildew, rotting, and attack by marine borers.

Atmospheric exposure causes little loss of strength over a considerable period. Wet nylon rope runs through blocks as easily as when dry, since there is no swelling. Splices can be made readily and develop nearly the full strength of the rope.

Nylon is resistant to petroleum oils and most common solvents and chemicals. It is affected by drying oils (such as linseed) and by mineral acids, such as sulfuric and muriatic. Manila rope begins to char at 300 F; nylon melts at 482 F but hardens when the flame is withdrawn.

Dacron is approximately 90 per cent as strong as nylon but has much less stretch. It is not weakened by rot, mildew, or sea water. It retains full strength when wet and shows little deterioration from long exposure to sunlight. It has good resistance to alkalis and acids and to abrasion.

Orlon has less working elasticity than nylon but more than manila. It has good resistance to abrasion and flexing under dry conditions, high resistance to mineral acids, common solvents and rot, fair-to-good resistance to alkalis. Of all synthetics it has the best resistance to deterioration from exposure to sunlight.

Polyethylene is up to 75 per cent stronger than manila. It is unaffected by rot, mildew, and fungus growth and is highly resistant to most acids (except nitric) and alkalis, as well as to alcohol-type solvents and bleaching solutions. It is swelled and softened by hydrocarbons, particularly at temperatures above 150 F.

Hoist with sling of nylon rope moves impeller wheel for compressor at Carrier Corp. plant. (Du Pont)

Polyethylene is moderately resistant to abrasion and high temperatures. It is excellent for use near high-voltage electric lines. It floats in water.

Glass fiber is noncombustible, resilient, flexible, and durable. It has high strength when dry but not when wet. It is fairly resistant to mildew and rot and is recommended where resistance to acids and high temperatures and dielectric properties are important. It is not resistant to severe flexing and abrasion.

Care of Rope

Fiber rope should never be exposed to high temperatures, acid splashes, or fumes. Sharp bends should be avoided. Where a sling passes over sharp edges, pads should be used to protect the rope.

Rope should not be kept in stock for long periods. Even with careful handling and favorable storage conditions, vegetable fibers deteriorate with age. When rope is used at infrequent intervals, its age should be considered in its use and retirement.

New rope, before being placed in service, should be thoroughly inspected throughout its length. It should be uncoiled by laying the coil on the floor with inside end down; then reach down through the center of the coil and pull this end up, unwinding the coil counter-clockwise. If the rope uncoils in the wrong direction, the coil should be turned over and the end pulled out on the other side.

Rope loaded over 75 per cent of its breaking strength will be permanently damaged. Damage can be

References—Fiber Rope

National Safety Council
Manila Rope Slings; Data Sheet 259.
Sisal Rope: Data Sheet 261.

National Safety News
Facts About Fiber Rope; June 1955.
Fiber Rope Ties in with Safety; June 1959.
No Rope Tricks; Jan. 1960.

Books
Handbook of Rigging; W. E. Rossnagel, McGraw-Hill, 1950.

Circle Item No. 138—Reader Service Card

THE ATLAS SLING IS DIFFERENT!

MACWHYTE • ATLAS SLINGS ROUND BRAIDED KENOSHA WISCONSIN

It's an All-American on your safe handling team!

Take a close look at the braided construction of an Atlas Sling!

The eight-part Atlas Sling is made by braiding two endless Monarch Whyte Strand wire ropes:— one right lay and one left lay. This produces an unusually flexible, light-weight, perfectly balanced sling in which all ropes react the same under load.

The Macwhyte Atlas Sling hugs the load with a safe, full-grip contact . . . and the braided construction resists kinking and speeds handling.

Macwhyte Slings are made in many standard types and sizes. We'll make slings to your specification or give you an engineered recommendation. Ask for sling circular 5308R, free on request.

Lightweight!

Highly flexible!

Resists kinking, speeds handling!

MACWHYTE Wire Rope COMPANY

2900 Fourteenth Avenue, Kenosha, Wisconsin, U. S. A.
Wire Rope • Slings • Cable Assemblies

190

detected by examination of inside threads, which will be broken in proportion to the overload.

Kinking is highly destructive. It may cause failure when the rope is again put under strain.

Sometimes ropes become kinked after use. One method of removing these kinks is to open the coil and recoil left-handedly. When the coil is completed, the free end is brought through the coil and the rope is then coiled right-handedly.

Uncoiling the rope and stretching it out in a single length is another method of unkinking where space permits.

Rope should be stored in a dry place where it will not be exposed to high temperature and where air may circulate through the coils.

Rope deteriorates quickly if saturated with water and not properly dried. Alternate wetting and drying will also cause rapid deterioration.

When lengths of rope must be joined they should be spliced, not knotted. A well-made long splice will retain up to 90 per cent of the strength of the rope; a knot, only 50 per cent.

Inspection should include examination of the entire rope for wear, abrasion, broken or cut fibers, displacement of yarns or strands, discoloration, or rotting.

To inspect inner fibers, the rope should be untwisted in several places to make sure they are bright, clear, and unspotted.

Rope should be replaced when it has lost its feel of pliability or stretch, or when the fibers have lost their luster and have become dry and brittle.

Industrial Trucks

TRUCKS of many types keep goods moving through factories, warehouses, docks and railroad terminals. Both hand and power-operated models are available for a variety of lifting and hauling jobs.

Industrial power trucks are operated by engines using gasoline or liquefied petroleum gas or by storage batteries. Many trucks designed for gas have been converted to LPG.

Catalytic exhaust purifiers on trucks powered by internal combustion engines permit their operation indoors where there is normal ventilation.

Power trucks should comply with code specifications for fire protection. These are minimum requirements for ordinary locations. For hazardous locations requirements are much stricter.

Hazardous locations are defined by the National Electrical Code as:

Class 1. Flammable gases or vapors may be present.
Class 2. Combustible.
Class 3. Easily ignitible fibers or flyings.

The Safety Code for Industrial Power Trucks *(ASAB56.1)* stipulated that electrical or gas-powered trucks may not be used in these locations unless specifically approved by the inspection authority for the location.

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CROSBY-LAUGHLIN
SHACKLES
SAY WHAT THEY DO
DO WHAT THEY SAY!
Load-Rated®

GUARANTEED CAPACITIES
SIZE FOR SIZE—UNEQUALLED!

Ask your distributor for catalog on the complete line

CROSBY-LAUGHLIN *Division*
FT. WAYNE, INDIANA
Forged fittings for wire rope and chain

Circle Item No. 139—Reader Service Card Circle Item No. 140—Reader Service Card

Slings handle 53-ton shaft as easily as bag of peanuts

The propeller shaft shown here is a pretty big baby. It's about 60 ft long, and has a body diameter of 29 in., and a flange diameter of 45 in. With Bethlehem wire rope slings on the job—it was a relatively simple task to move it about in the shop.

Bethlehem slings are strong and flexible. They're well made, and have good load-hugging characteristics. They can handle virtually any lifting assignment economically.

We supply Bethlehem slings in a variety of styles and sizes. And when there is a need for something special, our engineers are ready to go to work on the design. Perhaps you have a load-handling problem you'd like to discuss with our nearest sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Types of trucks covered by the code include high-lift, low-lift, fork, platform high-lift, platform low-lift, straddle, crane, powered hand trucks, other special trucks, and tractors.

Fork lift truck. This is the most widely used power truck. It is a cantilever type, self-loading truck with vertical uprights and elevating mechanism. Fork trucks permit handling of loads on shallow double-faced pallets as well as skids. Pallets afford a wider load distribution, an advantage in tiering.

Attachments are used for handling a variety of packaged and bulk materials. Clamps permit moving cartons, bales, and drums without pallets.

Dumping attachments are used for discharging liquid, solid, and granular materials.

Canopy guards are required by the code for fork trucks where the operator is exposed to danger from falling objects. The guard should be strong enough to support a capacity load and have no opening larger than the smallest package carried.

Scoop trucks shovel loose materials and elevate and dump them into hoppers and bins.

Powered hand truck. The truck, similar to a hand lift truck, is powered by a storage battery and controlled by a walking operator. A motor on the forward wheels supplies power for hauling.

A powered hand truck should have a dead-man control so brakes will be applied instantly when the operator releases the handle.

Platform truck. Used for hauling baggage, mail, and packages at railroad stations and steamship piers and in industry for some jobs where loads cannot be palletized. Loading is by hand.

Low-lift platform truck. Platform elevates just enough for horizontal movement. It picks up loaded skids, moves them and sets them down without manual handling or use of other equipment.

High-lift truck. This may be a fork, platform or special type. It has a litfing mechanism to permit the tiering of one load on top of another load.

Where packages are stacked higher than the operator's head, a protective canopy is needed on a fork lift truck.

Ram trucks. This type has vertical uprights and elevating mechanism like a fork truck. It is normally equipped with a single ram for picking up coils or rolls.

Roll-handling trucks for handling paper are equipped with a cable drum and two cables. Hooks on the cables hook over the ends of a rod which serves as an axle for the roll.

Crane trucks are equipped with boom, cable, and drum. Hooks, spreaders, and slings are used for moving heavy unit loads and objects too large to be handled on truck platforms or forks.

Tractors and trailers are used where large quantities of materials are moved relatively long distances, as at freight terminals and piers. Loading and unloading is done manually or by crane or other equipment.

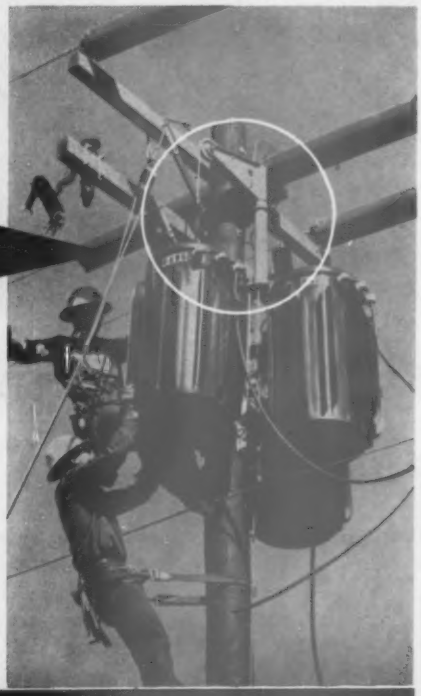
Crossover Bridges

Where loading docks are separated by railroad tracks, crossover bridges are needed. Some are of the drawbridge type. Others are mounted on four pillars that can be raised or lowered quickly by push-button control.

Cut costs...
Provide greater safety
with a MoPeCo
Transformer Hoist

- One position base mounting
- Swivel head permits multiple mounting
- Lightweight 2 piece portable unit (42 lbs.)
- Assembles easily at top of pole
- Tested at 3000 lbs. lift on cable
- Uses steel cable or manila rope

Save time with the MoPeCo hoist. You can install 3 transformers in only 30 minutes!



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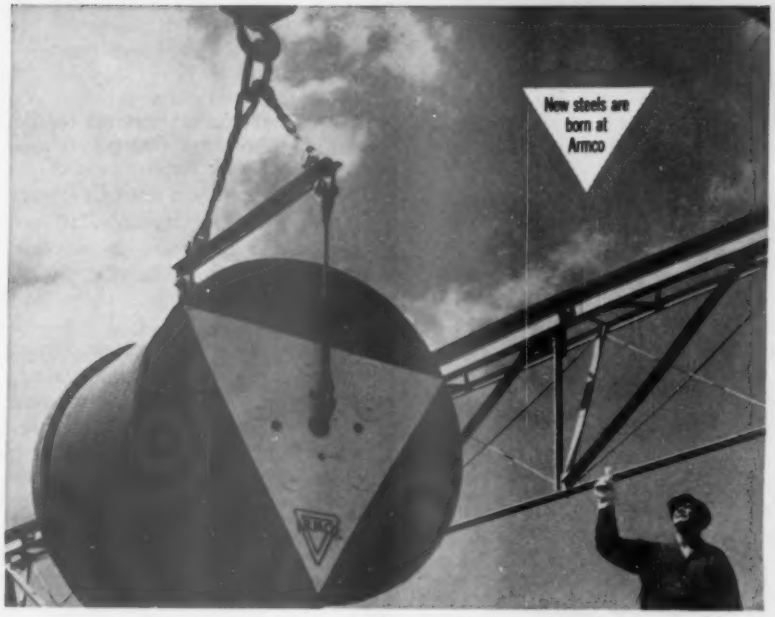


Tuffy is famous for "firsts"

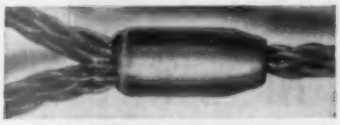
It's been that way for more than 30 years. Union Wire Rope started with an idea: that wire rope making should be a specialized field. And that the many different uses of wire rope needed specialized designs and constructions.

From that specialization have come many Union-developed "firsts." One of the most famous is the Tuffy line of patented 9-part machine-braided slings. The combination of extra strength and extra flexibility give you the ultimate in sling construction.

What does it mean to you as a sling user? Longer service life. Dependable operation. Greater safety. And ultimately the lowest cost sling you can buy, because of the extra service and efficiency.

Tuffy gives you these extras at no extra cost

Exclusive 9-part machine-braided fabric gives flexibility never found in any other sling. It's next to impossible to kink. If a kink should occur, it can be smoothed out easily leaving no damage.



Pressed-on metal ferrule gives the eye splice 100% of fabric strength. Applied under tremendous hydraulic pressure, it is also streamlined to eliminate projections and snags that might injure hands.

Get in Touch with Your Tuffy Distributor

Whether your sling jobs call for machine-braided Tuffy slings, or the new line of Union 6- and 8-part hand-braided slings, your Tuffy distributor is ready with the right item. Look him up in the Yellow Pages.

Tuffy Tips
—on safe use of Slings and Hoist Lines

Hoists vs. Hernia

About 75% of one manufacturer's compensation claims were connected with hernia — a common hazard in heavy lifting. Hernia claims average around $750. No need to stress the need for hoists instead of muscles for lifting tasks.

Hoist and Sling Safety Rules

1. Use a proper size hoist—not human backs and muscles—for every heavy lifting job.
2. Never use load chains as slings. Chain links break easily after distortion.
3. Use the sling that's right for the job. There's a Tuffy Sling for every purpose.
4. When loading slings with more than two legs: load a 3-legged sling as though it had 2½ legs; load a 4-legged sling as though it had 3 legs.

Use Tuffy Hoist Line

Tuffy Hoist Line and Tuffy Slings are the ideal team for efficient, safe hoisting at lowest long-run cost. The extra strength, toughness and service life we build into the Tuffys results in ultimate low cost.

FREE!
New Tuffy Sling Handbook

All about slings from A to Z, including types, dimensions and rated loads. Address **Union Wire Rope Corporation, 2224 Manchester Ave., Kansas City 26, Missouri.** Specialists in high carbon wire, wire rope, braided wire fabric, and stress relieved wire and strand.

2

UNION Wire Rope

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
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Twelve stock sizes fit hook shanks ranging from ¾ through 2½ in. Latches for larger shanks available.

New Peerless
SAFETY LATCH
converts standard hooks to safety hooks in minutes

Make all hooks on your hoisting equipment safety hooks . . . convert them in minutes with simple tools and a Peerless Safety Latch. Made of sturdy corrosion-resistant materials and designed for long life.

The latch installed costs less than machining a conventional safety hook, can be applied to any make of hook on any type of hoist or sling, has finger lugs to protect hoist operator.

Write us for full particulars

THE HARRINGTON COMPANY
Plymouth Meeting 14, Pa.

Hand Chain Hoists (1/4 to 60 tons) • Electric Hoists (170 to 4000 lb.)
Trolley Hoists (1/4 to 12 tons) • I-Beam Trolleys (1/4 to 20 tons)

Wire Rope

—From page 189

sheaves and drum. Minimum tensile strength, about 160,000 psi.

Iron. Low tensile strength (about 70,000 psi.) but ductible. It has been used principally in elevator service where it is being replaced by traction steel.

Corrosion-resisting metals. Where corrosion is a factor, stainless steel, bronze, and monel metal are used frequently. All-metal ropes are preferred to fiber-core ropes.

Stainless steel is used in marine operations, on aircraft, and where rope is exposed to alkali, acids of an oxidizing nature, (such as nitric), neutral brine, food products, and temperatures damaging to carbon steel ropes.

Bronze is slightly stronger than iron rope. It is used frequently in marine service.

Monel metal is used where rope is exposed to marine atmospheres, acids of a reducing nature (such as sulfuric, muriatic, and hydrofluoric), neutral brines, food products, pickling solutions, and aromatic chemicals.

These ropes are furnished in complete assemblies and slings with fittings attached. Temperature, humidity, nature and concentration of corroding chemicals should be considered in selecting equipment.

Preformed Ropes

A preformed wire rope is one in which each individual strand, and at the same time each individual wire, is permanently formed into the helical shape it will assume in the finished rope. Advantages of preformed rope are:

1. Higher resistance to bending fatigue.
2. Greater flexibility.
3. Less susceptible to kinking and therefore easier to install.
4. More equal distribution of load on each strand and wire.
5. More resistant to whipping and vibration.
6. Hugs small drums better and winds more uniformly and smoothly.
7. Operates over sheaves with less rotation around its axis, with less wear on rope and sheaves.

8. May be socketed with less danger of unbalancing the lay of the rope below the base of the socket.
9. Does not unravel when seizings are removed from ends of rope.
10. When outer wires break through fatigue, they do not protrude or "porcupine." This reduces risk of injury in handling.

Since broken wires are less conspicuous in preformed rope, greater care is needed in inspection. However, broken ends separate slightly, permitting detection.

Strength and other qualities are the same for preformed and non-preformed rope of the same size, grade and construction.

Slings and Fittings

Wire rope slings are widely used for heavy loads. Types of slings are grommet, single leg, two-leg bridle 3-leg bridle, 4-leg bridle.

Legs can be single-rope, double rope, grommet, braided single, or braided double.

Load-end fittings can be loops, links, hooks, chokers, sockets, shackles, equalizing thimbles, slip-through thimbles, plate clamps, or special.

Safety hooks on cranes, hoists, and other lifting equipment prevent the load from jarring loose from the hook until the hook is unlocked manually. The latch also acts as a gauge to indicate whether the hook is sprung or not.

Complete assemblies can be obtained from manufacturers who should be consulted when slings are to be used for special purposes.

Maximum strength is obtained when all legs of the sling are vertical. The smaller the angle formed between the legs of the sling and the horizontal, the greater the tension on the legs and the less weight which can be lifted.

Where a load has sharp corners, pads or sling saddles should be placed between load and sling.

How to Order

When ordering wire rope, the following information should be furnished:

1. Length.
2. Diameter.
3. Construction—number of strands; number of wires per strand; arrange-

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Now–two kinds of
CAMPBELL SLING CHAINS
FACTORY-MADE
CUSTOMIZED

Campbell offers Factory-Made and Customized Sling Chains . . . both with the same strength and working load limits!

CAMPBELL Factory-Made SLING CHAINS

Available in **all styles** from Campbell's three strategically located plants. In **three grades:** Cam-Alloy, Wrought Iron, High Test Steel. Campbell **Certificates of Test** issued for your safety. Write today for Catalog S-558.

CAMPBELL Customized SLING CHAINS

You can order slings assembled by Campbell distributors or at Campbell factories and warehouses from pre-tested components. Or you can assemble slings right on the job. In single or double types, Alloy grade. **Certificates of Test** issued for complete assemblies or components. Write today for Catalog CSA-1.

CAMPBELL CHAIN

CAMPBELL CHAIN *Company*

FACTORIES: York, Pa.; West Burlington, Iowa; Union City, Calif.
WAREHOUSES: E. Cambridge, Mass.; Seattle, Wash.; Portland, Ore.; Atlanta, Ga.; Dallas, Texas; Chicago, Ill.; Los Angeles, Calif.

One of these sling chains will meet your most exacting needs

One-day delivery is forthcoming when you specify ACCOLOY KUPLEX Sling Chains. Made up locally by an authorized KUPLEX distributor, these slings feature matched components which have been proof-tested at the factory at twice working load limits to assure their being as strong as the chain itself.

Factory-built all-welded construction is assured when you buy ACCO *Registered* Sling Chains. Registration ring and certificate—signed by ACCO—attest to the successful test performance of the sling.

See your local distributor for ACCO *Registered* or ACCOLOY KUPLEX sling chains. If by chance he does not carry the sling you want, write our York, Pa., office for further details.

ACCOLOY KUPLEX

• Available in 6 chain sizes (¼" to ⅜") in single, 2-leg, 3-leg and 4-leg styles. Assembled from Shaped Master Link, Drop Forged Kupler and Hook, ACCOLOY 125 chain.

ACCO Registered®

• Factory-built with ACCOLOY 125 chain. Chain is welded under scientific control and heat treated to optimum strength levels. New Shaped Master Link withstands deformation under heavier loads.

ACCOLOY KUPLEX SLING CHAINS
ACCO Registered® SLING CHAINS

ACCO **American Chain Division • American Chain & Cable Company, Inc.**
Bridgeport, Conn. • Factories: *York and *Braddock, Pa., *San Francisco, Calif.
Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston
*Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore. *San Francisco
*Indicates Warehouse Stocks

ment of wires in strand, such as Seale or Filler Wire.

4. Type of Fabrication—if preformed rope is desired, it should be specified. Otherwise, nonpreformed rope will be furnished.

5. Finish—galvanized finish should be specified if required. Otherwise, bright rope is usually furnished.

6. Grade—improved plow steel, plow steel, iron.

7. Lay—regular lay right lay will be furnished unless otherwise specified. Lang lay or left lay is furnished on request.

8. Core—specify fiber core, independent wire rope core, or wire strand core.

9. Lubrication—type of lubricant is not specified unless there are unusual service requirements. Each construction and grade of rope is treated with a lubricant adapted to that particular rope for a wide range of service conditions.

Hoisting Equipment

HOISTS are mechanical devices suspended overhead and used to raise or lower loads through a vertical plane. Common types are:

1. Block and tackle.
2. Hand chain.
3. Electric.
4. Air operated.
5. Portable floor cranes.
6. Jib cranes.

Block and tackle. Blocks threaded with fiber or wire rope are used for raising and lowering scaffolds, hoisting objects, and other industrial purposes.

When used to lift heavy materials or to hold loads suspended, as on heavy-duty scaffolds, wire rope is more serviceable than fiber rope. Wire rope is too stiff for manual handling and requires a winch for operating.

Hand chain hoists may be used where overhead cranes cannot be installed because of lack of head room. They also handle heavy pieces at machines. One hoist may handle the work at several machines.

Chain hoists may be portable, portable but permanently hooked onto a monorail trolley, or built into the trolley as an integral part.

Steel is recommended for load-sustaining parts. It withstands sud-

Circle Item No. 147—Reader Service Card

den shock better than cast iron and is lighter in weight. Chain should be welded, and of quality steel.

Each hoist should be equipped with a braking device which automatically locks the load when hoisting is stopped.

Chains and sheaves should be lubricated at intervals, depending on atmospheric conditions.

Electric hoists range in capacity from ⅛ to 20 tons, are faster than hand hoists, and less fatiguing for large loads. The light-duty hoist uses link chain for lifting. The heavy-duty uses wire rope.

Electric hoists should be provided with rope or other nonconducting control cords. Each rope should be marked "hoist" or "lower." One method is to use an arrow pointing in the direction in which the load will move when the rope is pulled.

Limit stops prevent the hoist from traveling too far in case the operating handle is not released in time.

Air hoists, operating on compressed air, are used where sparks from electric equipment might be a hazard. The air hoist is limited in travel because of dependence on air lines.

Grabs, grips, and tongs of several types have been developed for use with overhead handling equipment, such as cranes, monorails, and hoists. Some can handle a variety of objects while others are more specialized.

Portable floor cranes are mounted on wheels and can be moved either by hand or under their own power. These raise and lower loads in a vertical line. They will not rotate around a fixed point.

Portable cranes are useful in plants where overhead belting or shafting prevent use of overhead cranes, and where service is not frequent enough to justify more expensive equipment.

The lifting mechanism may consist of a winch with wire rope and block, or a chain hoist, operated by hand or electric power.

Electric hoists should be grounded to prevent shock in case of short circuit.

Jib cranes lift, lower, and rotate loads within the circle covered by

References—Trucks, Hoists, Cranes, Conveyors

National Safety Council

Powered Hand Trucks; Data Sheet 317.

Crawler, Truck and Similar Cranes; Data Sheet 448.

National Safety News

It Goes Where Men Can't (Conveyors); Jervis C. Webb, Oct. 1951.

Sweetening the Fork Truck's Breath; Apr. 1955.

Industry's Pack Mules (Hand Trucks); H. W. Overman, Apr. 1955.

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Your Fork Lift Trucks and the Men Who Drive Them; W. L. Sheffield, Aug. 1955.

Outfitting Cranes for the Automatic Factory; W. C. Bennett, Dec. 1955.

How Safe Is That Chain Hoist? E. S. Moorhead, Feb. 1956.

How About Hoists? B. J. Povolny, Jan. 1957.

Guarding Overhead Lifting Devices; A. J. Ruzich, July 1957.

American Standards Assn.

Conveyors, Cableways and Related Equipment, Safety Code for, B20.1-1957.

Cranes, Derricks, and Hoists, Safety Code for, B30.2-1943.

Industrial Power Trucks, Safety Code for, B56.1-1955.

Powered Industrial Trucks, Safety Code for, B56.1-1959.

(See also manuals published by manufacturers of equipment and their trade associations.)

For Safe, Easy Handling of Carboys and Bottles

MORSE

Universal Carboy Rocker #10

For acid carboys, from 18x18x23 to 20x20x25. Outlet of bottle is approximately 20" above floor for safe dispensing. Two 3" diameter wheels make this Universal Carboy Rocker a combination rocker and truck. **Special Polyethylene Carboy Rockers available.**

MORSE

Bottle Tipper #18

Handles 5-gal. glass bottles with ease and safety. Two steel straps, securely locked with a simple catch, hold bottle in position.

For Morse catalog, clip this ad to your letterhead.

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MANUFACTURING CO., INC.
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ANNOUNCING

PENGO-Prope

—the most satisfactory pulling line available today!

* **GREAT STRENGTH**
(9,600 lbs. tensile for ¼" diam.)

* **LIGHT WEIGHT**
(11.7 lbs. per 100 ft., ¼" diam.)

* **HANDLES AND SPLICES LIKE MANILA**
in any climate or weather.

* **WATERPROOF,**
(even salt water) can't mildew; excellent dielectric properties.

PENGO-Prope is a synthetic rope of special construction for pulling line use; no other rope can match its safety and cost-saving performance! Write today for literature, prices.

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LINE STRINGING SWIVELS

Special models of the well-known MILLER swivels redesigned specifically for tension line stringing use.

The result is a reliable, heavy duty swivel of proper dimensions to pass through stringing sheaves and bullwheel grooves easily, without damage.

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TOPS *in* STRENGTH

TM Alloy Chain is used wherever rugged "brute strength" is a requisite. For example, the working load limit of ¾" TM Alloy is 23,000 pounds. It's tougher, safer and far less costly than other grades of chain tested. Order to your specifications. Available everywhere from Industrial Distributors, Steel Warehouses and Hardware Wholesalers.

S. G. Taylor Chain Co., Inc.
Hammond, Indiana.

Everything Swings on TM Slings

Taylor Made CHAIN SINCE 1873

a rotating arm or jib upon which runs a trolley. The jib is usually supported from a wall or column. A hoist, hand-operated, air, or electric, is suspended from the trolley.

Dockboards

Movable plates for bridging the gap between loading platforms and carriers are needed for both hand and power trucks. Dockboards are usually of steel or light weight magnesium or aluminum alloys.

Sides should be turned up at right angles to prevent trucks running over the edge. Handholds facilitate handling.

Dockboards should have a high friction surface to prevent slipping of vehicles or persons. They should be designed so when they are in position the ends will have substantial contact with the loading platform and the carrier to prevent rocking or sliding when in use. * * *

Aids to Manual Handling

Hand trucks, wheelbarrows, and **dollies** are on the borderline between mechanical and manual equipment. They are durable and uncomplicated but need regular servicing. Axles should be kept well lubricated.

Hooks are used for handling logs, lumber, crates, boxes, and barrels where the object will not be damaged. Hooks should be inspected daily and kept sharp. If a hook is carried in the belt, the point should be covered. The worker should be trained to use the hook so that it will not glance off hard objects.

Bars. The point or edge of a crowbar should be kept sharp and position of hand and body should minimize the chance of pinching or falling if the bar should slip or the object move suddenly.

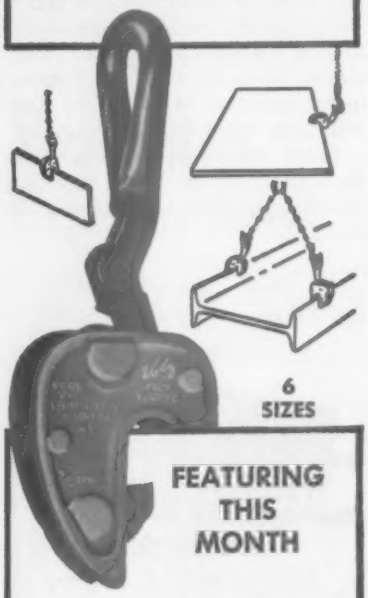
Car movers, not crowbars should be used to move cars on steel rails. When two men are needed, two car movers should be used. The same mover should not be used by more than one man.

Rollers are used for moving heavy, bulky objects. A sledge or bar, not hands or feet, should be used to move rollers under loads.

Circle Item No. 149—Reader Service Card

YOUR BEST MOVE . . . MOVE *with* MERRILL MATERIAL HANDLING DEVICES FOR THE MOST IN *Safety and Economy*

Imitated, but never duplicated, Merrill Lifting Clamps are Drop Forged to give you Safety in Handling and Economy in Operation.



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FEATURING THIS MONTH

TWIN-LIFTER
For lifting barrels, drums, with or without heads removed.

Over 25 Material Handling Devices described in our catalog C-2.

Ask for a copy.

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56-28 Arnold Ave., Maspeth, N. Y.

SECTION 8

MACHINE OPERATION and GUARDING

IN SECTION 8:

Guarding the Machine.....205
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Power Saws.....216
Lubrication.....218

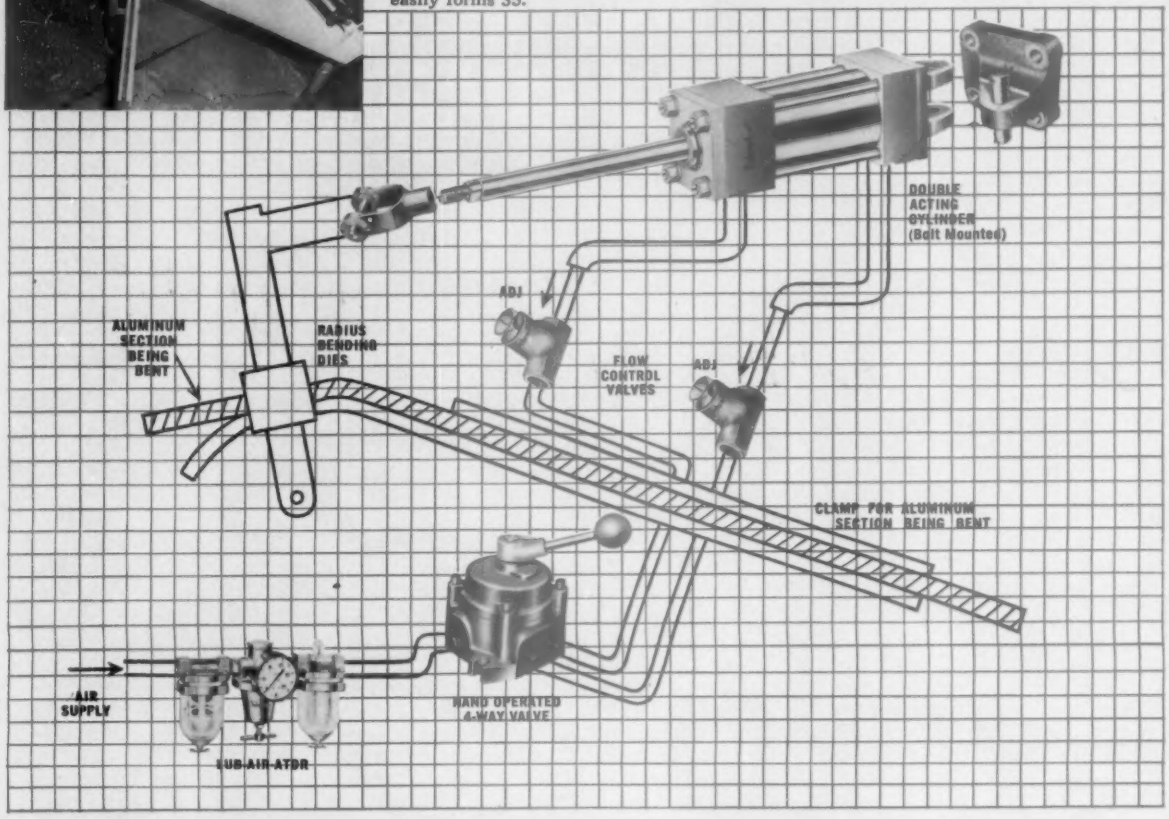
MOST MACHINES and processes can be guarded more or less effectively. But if the guard interferes with production or the cost is excessive, it is not likely to be popular with operators or management.

Modern machines have a high degree of built-in safety. Enclosed moving parts, push-button controls and automatic pressure lubrication make for safer operation. Electronic and radioactive devices offer interesting possibilities.

Automation, with increasing use of automatic processes and remote control, will undoubtedly remove many familiar hazards and probably introduce some new ones.

Mechanical safeguarding involves far more than keeping moving parts under cover. It includes electric power and its controls, and hand and portable power tools for production and maintenance.

Here's a typical example of how fabricators use Schrader to reduce fatigue and hazards . . . while increasing production. Schrader Air Products in the large schematic perform a metal-forming operation at Lance Awning Corporation, Lake Worth, Florida. Power is supplied by a Schrader double-acting bolt-mounted air cylinder. On pressing the 4-way valve, the cylinder piston advances at proper speed, checked by flow control valves, bending an aluminum section to a desired angle. Reversal of the 4-way valve returns the cylinder and bending dies to rest, permitting safe removal of the bent section. "Air control makes it a one-man job," says the Plant Manager. "Two men had to work hard to form this radius bend on 25 parts per hour before we installed a Schrader Air Cylinder on it. Now one man easily forms 35."



FABRICATOR JUMPS PRODUCTION 40%... ELIMINATES HAZARDS AND FATIGUE...WITH STANDARD SCHRADER AIR PRODUCTS

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With Schrader's help, operators keep fresh and efficient. Added safety gives operators a new confidence in their machines. This confidence, coupled with reduced fatigue, raises production.

Look over your plant for jobs to automate with Schrader, such as inspecting, assembling, testing, packaging. Air can push, pull, hold, position and move work repetitively . . . make light of weight-lifting . . . unplug bottlenecks . . . all at unmatched low cost and drop-in-the-bucket maintenance.

Plan hookups yourself from Schrader's quality lines of Air Valves, Cylinders and Accessories. You can have expert help from experienced Schrader engineers.

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QUALITY AIR CONTROL PRODUCTS

Guarding the Machine

Transparent plastic is resistant to impact and easily fabricated into guards. This guard protected operator and spectators at a machine-tool show.

TODAY'S MACHINES, with moving parts enclosed, present a trim, streamlined appearance with a high degree of built-in safety. Overhead belts and shafting have been replaced by individual motor drives. Pressure lubrication reaches remote bearings without exposing the oiler to hazard or shutting down the machine.

The point of operation, however, hasn't been entirely tamed. Few operations now require the operator's hands in the danger zone but they do get there at times and machinery still ranks high among the causes of serious injuries. The individual must be protected against his own lapses as well as against mechanical hazards.

Standard guards for many types of machines are on the market. These are often installed on older machines, on newer ones where built-in guards have not been provided, or where specially made guards are needed. For power presses, circular saws, and other machines, many types of guards are available.

A guard should not restrict production seriously. If it does, it will not be popular with either operator or management.

Some operations can be guarded effectively with commercial guards. Others require custom-built guards developed through study of the job by both operating and safety departments.

Machines involved frequently in accidents include woodworking machines such as circular saws, jointers and planers, and power presses.

Guard design must often be approved by state factory inspectors and insurance engineers. Since state codes are not uniform and at best represent only minimum requirements, recommendations of the American Standards Association or the inspection department having jurisdiction are the best guides.

Point of Operation

Guarding the point of operation effectively is much more difficult than enclosing power-transmission apparatus.

Point-of-operation guards are installed at those parts of machines where cutting, shaping, or forming is performed, and at other points potentially hazardous to operators inserting or manipulating stock.

Guards should protect operators both from moving machine parts and from moving materials. Safeguards are of these types:

1. Automatic feeding and ejecting.
2. Two-hand control.
3. Redesign of machine parts so the operator cannot get into the danger zone.
4. Devices that stop machines by electronic devices while any part of the body is in the danger zone.
5. Devices that pull or push hands away from the danger zone.
6. Barricades, covers, hod guards, and oher enclosures.
7. Quick-acting brakes operated by contact of the body.
8. Interlocking devices.

Hood enclosures and cover guards are used on woodworking machines and other types of equipment. Frequently, such guards are automatic. Others are of rigid construction.

Nip hazards, such as rubber mills, calender rolls, dough brakes, and others, can be protected by sensitively adjusted controls that operate dynamic brakes when contacted by any part of the operator's body. These controls stop the machine quickly. *—To page 210*

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Electrical Equipment

Concrete block vault houses transformers of indoor electrical sub-station. Air for cooling is drawn through grilled opening at right and leaves through opening in opposite wall. In case of fire, metal slats in opening close automatically and shut off air supply for fire. (Superior Tube Co.)

ELECTRICITY dominates our whole way of life. Light, transportation, communication and industrial operation depend on enormous amounts of uninterrupted electric current. It has made factories cleaner, safer, and much more efficient.

The world's demand for power will continue to grow. Looking forward to the time when fossil fuels will be inadequate, the atomic power plant is entering the picture.

Thanks to modern utilization and protective equipment, electricity serves us with a high degree of safety. But safeguarding life and property demands constant vigilance and careful maintenance of all apparatus.

Rules for safe installation of electrical equipment are covered by the *National Electrical Code* issued by the National Fire Protection Association. Local codes, of course, have preference over the national code, but usually they follow it.

Purchase of most electrical equipment should be based on approval of the equipment by a recognized testing laboratory. The equipment has then passed rigid specifications and is re-examined periodically to make sure the manufacturer maintains high standards.

Installation. All electrical work should comply with applicable local or national codes.

Electrical equipment and controls should be so located that sufficient working area is present and employees can move safely about the area. All exposed current-carrying parts should be further protected by enclosures, railings or special guards.

Isolating equipment. Electrical testing operations, transformers, control boards, and similar equipment should be placed in special rooms to which only authorized persons have access.

If a separate room is not feasible, enclosures should be built around equipment having exposed conductors. Metal enclosures should be effectively grounded.

Barriers may be used to prevent accidental contact with electrical equipment. Frames may be made of wood, rolled metal shapes, angle iron, or pipe.

Filler may be of wood strips, sheet metal, perforated metal, expanded metal, wire mesh, or shatterproof transparent material.

Some protection can be obtained by elevating wires and current-carrying parts at least 8 ft. above any working level to which employees (other than qualified electricians) have access.

Where long metal parts, such as rods, bars, and pipes are handled, partial enclosures or barriers should be provided to prevent contact with overhead electrical installations.

Warning signs should be displayed near exposed current-carrying parts, especially high-voltage installations.

Many standard machine-guarding practices apply to electrical equipment, but there are certain hazards peculiar to electricity. Particular attention should be given to the *National Electrical Code.*

Protective grounding is necessary for exposed non-current-carrying metal parts if the equipment is supplied by means of metal-clad wiring, when installed in a wet location, and when it operates with any terminal at more than 150 volts to ground.

Parts to be grounded include motor frames, cranes, cases of trans-

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Underwriters' Laboratories

Electrical Appliance and Utilization Equipment List.

Hazardous Location Equipment List.

formers and oil switches, wiring conduit, and metal lamp sockets.

Frames of all portable motors which operate at more than 50 volts to ground should be grounded.

Motors should be of the type and size required for the load and for conditions under which they must operate. Overloading for long periods, use of non-approved motors in areas containing flammable vapors or dusts, and defective wiring should be avoided.

Motor windings should be protected from metal particles, dirt, dust, lint, or other material which may damage the windings or ignite.

In areas containing flammable dust and gases, motors designed for hazardous locations should be installed in accordance with the *National Electrical Code*.

Grounded metal enclosures are recommended for starting rheostats, switches, fuse panels, and other operating accessories.

In some devices, both switch and fuses are enclosed in a cabinet arranged so the switch can be operated without opening the cabinet. The switch is interlocked through a cam so fuses are inaccessible until the switch is opened.

Another type of enclosed switch permits the door of the cabinet to be opened with a key, even though the switch is closed. With either type cabinet, it is possible to padlock the door open or closed, and the switch can be padlocked in the open position.

Maintenance precautions. When repair work is being done on motors, controlling devices, or the machinery they drive, the circuit should be de-energized by opening necessary switches and locking them in the open position.

If a switch cannot be locked open, it should be blocked and a tag attached showing the switch is to be closed only by the man whose name appears on the tag. Warning signs should be displayed.

Wiring depends on type of building construction, size and distribution of electrical load, exposure to dampness or corrosive vapors, location of equipment, and other factors. For most plant conditions, rigid metal conduit, effectively grounded, is preferred.

—*To page 214*

Tools—Hand and Power

HAND TOOLS, the craftsman's companions since the beginning of civilization, are still needed to put the finishing touches on many machine-made products and in construction and maintenance work.

Estimates are that hand tools are involved in from 5 to 15 per cent of disabling occupational injuries and a large but unknown number of minor wounds. Most of these are caused by accidental contact with cutting edges or by severe blows.

Portable power tools speed up many jobs in industry and at home and have the added hazards of high speed. With electric tools there is also the risk of shock.

Types of Tools

Tools commonly used in industry are of 5 general types:

1. **Metal cutting.** Cold chisels, marking tools, hacksaws, bull chisels, files, tin snips, and cutters.

2. **Wood cutting.** Chisels, gouges, saws, axes, hatchets, knives, brad awls, planes, scrapers, bits, and drawknives.

3. **Lifting.** Levers, crowbars, jacks, hooks, and shovels.

4. **Torsion.** Wrenches, pipe tongs, screwdrivers, and pliers.

5. **Striking.** Hammers, sledges, mauls, picks, and punches.

Accident causes. One or more of four causes are primarily responsible for injuries. Following are examples:

1. A wrong or improvised tool—a file or screwdriver for prying, a wrench for hammering.
2. A defective tool—a mushroomed chisel head; a dull saw or knife; a split maul handle; a tool of poor quality.
3. Tools incorrectly used—striking two hard-surface tools together; failing to take practice swing with sledge to adjust for clearance; pulling on pliers in line with face.
4. Tools not put away—wood chisel loosely laid in tool box; tools left on edge of machine; knife left on table.

Selection. Tools for both routine and special work should be kept in stock or readily available. High-grade tools are the best buy and the difference in initial cost is offset by longer life, reduced upkeep, and lessened risk of accident.

Suitable arrangements should be made and responsibility placed for the purchase, handling, and care of tools. The purchasing department should be kept informed of tool performance as a guide to future purchases.

Alloy steels combine strength and toughness with light weight which justifies the higher cost for some jobs. Alloys are used for hammers, wrenches, screwdrivers, woodworking tools, pliers, rivet sets, saws, knives, and punches.

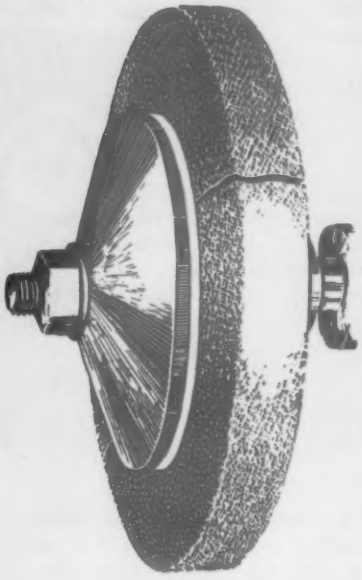
Some alloys resist mushrooming and chipping but no tool should be subjected to unnecessarily rough use.

Nonferrous hammers or mallets

Toolboard encourages replacing tools. Missing and defective equipment is easily spotted. (Gulf Oil Co.)

THE STORY *of the* BROKEN GRINDING WHEEL

A whirling grinding wheel can tell its own story of havoc when it explodes . . . But in this case Perks Safety Washers do the telling!



A test conducted in the Sta-Safe laboratory used the new neoprene faced Perks Safety Washers and an 8" grinding wheel cracked in two places. At 5,000 RPM —an outer surface speed of 12,500 feet per minute— Perks Safety Washers held the wheel intact!

Standard Safety does ***not*** recommend to you the use of broken grinding wheels—even with Perks—but Standard Safety does recommend Perks Safety Washers as a precaution against possible tragedy in your company. Perks Safety Washers are easily installed on any size grinding wheels. Keep your equipment and personnel safe-guarded. Write now for Bulletin No. 54 containing complete information about Perks Safety Washers.

STANDARD SAFETY EQUIPMENT CO.

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GUARD YOUR FANS NOW
Protect Workers From Injury
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This fan guard prevents hand, arm and head injuries. Made of strongly woven cotton mesh fabric, with one-quarter inch openings. It is washable, mildew proof, non static, and won't interfere with the normal flow of air. Cover protects back and sides of fan as well as the front.
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should be used for striking tempered or case-hardened tools. These hammers are usually made of copper, lead, bronze, brass, rawhide, or wood.

Handles. With hammers, sledges, axes, and picks, the greatest strain is where wood and metal join. An adequate supply of good handles should be kept in the toolroom. These should be straight-grained wood, free from slivers. Hickory, ash, and maple are preferred. Handles should be fitted by an experienced person.

Insulated tools. For working near electrical equipment, tools with insulated handles are frequently used. These provide desirable protection but are not a substitute for rubber gloves and other protective devices.

Marking tools. Steel stamps and holders for stamping identification marks on machine parts and other metal surfaces are available in alloys which resist mushrooming and do not chip readily.

Car movers. For moving cars on rails, car movers which do not slip readily are available. When two men are needed to move a car, two car movers should be used. Ordinary crowbars should not be used.

The Tool Room

Centralized tool control facilitates uniform inspection and maintenance of tools. Protective equipment, such as goggles, should be recommended and issued with the tools.

Centralized control also makes it possible to keep records on tool failure and locate unsafe conditions and unsafe acts. Tools are exposed to less damage than with scattered storage.

A procedure can be set up so the attendant can send tools in need of repair to a department equipped for reconditioning.

A set of numbered checks can be issued to each employee at the time of employment. These are exchanged for tools at the supply room. By this system the attendant knows where each tool is and can call it in for inspection at regular intervals.

When there are operations at several locations it is not always

practicable to maintain a tool supply room. In such cases the foreman should inspect tools frequently and take out of service those found defective. A check list is helpful.

Some workmen provide their own tools. These should receive the same inspection as those owned by the company.

Carrying Tools

Tools should never be carried when both hands are needed for climbing. A strong bag, bucket, or other container should be used for hoisting or lowering tools.

Chisels, screwdrivers, and pointed tools should never be carried edge or point up in the pocket. They should be carried in a tool box or cart, in a carrying belt like those used by electricians and structural steel workers, in a pocket tool pouch or in the hand with points and cutting edges away from the body.

Storage boards for tools encourage their return.

Racks or bins which can be moved to the work area are also useful.

Each workman's tools should be kept in a box or rack convenient to his work area. The box should have designated places for wire brushes, chisels, saws, and knives to avoid sharp edges being exposed.

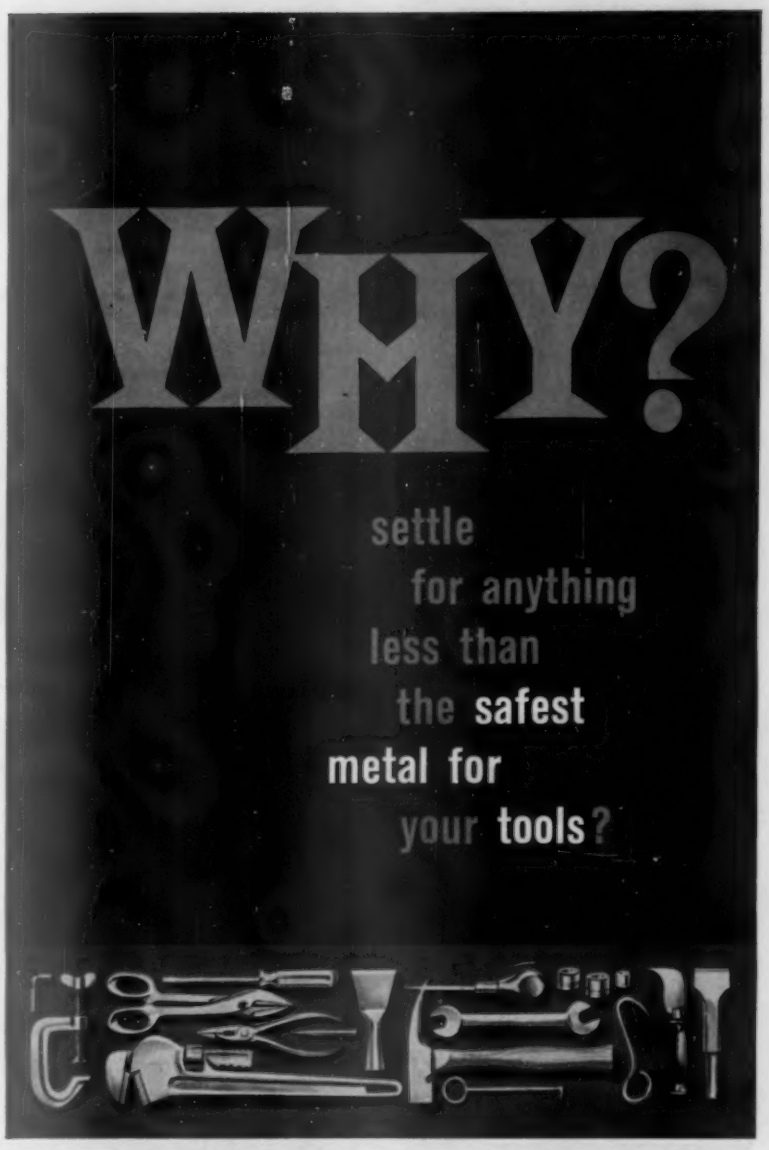
Inspection. Permissible wear limits for tools should be set up as a guide for inspection when they are returned to the crib. Lacking such standards, the attendant or inspector should be qualified to pass on the condition of the tool.

Periodic inspections of tool operations are needed to insure efficient control. Inspections should include housekeeping in the tool crib, tool service, number of tools in the inventory, handling procedure, and condition of tools.

Maintenance and repair require adequate facilities, such as work benches, vises, forge or furnace for hardening and tempering, tempering baths, repair tools, grinders, goggles, and adequate lighting. Repairs should be done by trained men.

Non-Sparking Tools

Tools of nonferrous materials are often used where flammable gases, highly volatile liquids, and



BERYLCO TOOLS when safety counts

Today's plant engineer always puts safety near the top of any list. He knows that modern tools . . . made of low-cost **beryllium copper** . . . mean far more than the words "spark-resistant." They not only cut chance of costly fire and explosion, but these up-to-date tools are non-magnetic and can never corrode. Workers like their strength and handling ease.

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Reading, Pennsylvania

other explosive substances are used or stored. These tools are made of such metals as aluminum, bronze, brass, and beryllium-copper.

Tools made of these alloys include hammers, chisels, punches, prybars, screwdrivers, scrapers, spatulas, picks, and shovels. Special tools of any type can be made to order.

Some substances easily ignited include gunpowder, lint, TNT, carbon disulfide, and ethyl ether.

Being softer than steel, nonferrous tools are less likely to break off fragments from the metal being worked on by the tool.

With continued use, these tools may become impregnated with particles of foreign substances which may cause sparks if not removed. Frequent inspection is needed.

Portable Electric Tools

General classifications of hand-operated, power-driven tools are:

1. Abrasive tools, such as disk and portable belt sanders, polishers, and bench and flexible shaft grinders.
2. Drills.
3. Saws and other cut-off tools and routers.
4. Assembly tools, such as screwdrivers, nut runners, and tappers.
5. Hammers.
6. Sheet-metal shears.
7. Fans.

Portable electric tools are generally designated as:

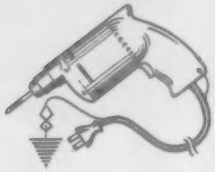
Light duty, for intermittent use on light work.

Special duty, or **standard duty,** for slightly heavy work or fairly continuous operation.

Heavy duty, for continuous operation and production service or for heavy work.

Safety switches, which operate the motor only while the switch is held in the closed positions, should be used.

PORTABLE ELECTRIC TOOLS



1. Use only equipment that is in good condition. Take good care of it.
2. Be sure the tool is properly grounded.
3. Report the following unsafe conditions:
   Defective or broken insulation on cord.
   Improper or poorly made connections to terminals.
   Broken or otherwise defective plug.
   Loose or broken switch.
   Brushes sparking.
4. Do not overstrain the tool, thus overloading the motor.
5. Never use a portable electric tool in the presence of flammable vapors or gases, unless it is designed for such use.

NSC Safety Instruction Card 91.

Grounding the housing by means of a third wire or central grounding is the most practical method of safeguarding against shock. These power tools should be tested periodically to determine if the ground is effective.

Machine Guards

—From page 205

Two-hand controls frequently are installed on power presses, bakery machinery, guillotine paper cutters, and other types of equipment where barrier guards are not practical.

Interlocking devices prevent operation of the starting control when the cover or barricade is not in place. These are used on centrifugal extractors, dough mixers, tumblers, and some types of pressure vessels.

Color is an important safeguard. Highlighting the point of operation with light tints in contrast to the darker background of the machine reduces the effort of seeing. Guards painted in high-visibility colors are also conspicuous when missing.

Power Presses

Safeguarding power-press operations is one of industry's major accident-prevention problems. Because of the many types of presses and specialized operations performed, the subject is highly complicated. Material on press operation is available from the National

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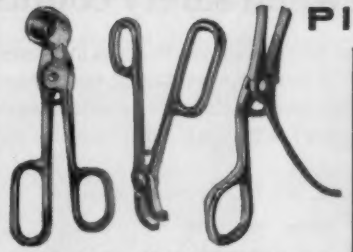

Pliers

A plier or tong for every Safety requirement either from our standard models—or engineered to your specific NEEDS.

COMMON SENSE . . .

As' one tells another, "Safety" just doesn't happen. It is developed by field trained safety engineers, competent to "see" your problem and help you eliminate costly accidents to your man power and equipment. Pliers, Tongs, Safety Lock-Outs, Silenc-air Mufflers, Stretcher Cases, Spruemasters (to remove casting) —What ever your problem is get in touch with . . . . . .

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Lock-Outs

NOT A WIRE ON TAG . . . A Safety LOCK-OUT that is fool proof as the Lock-Out cannot be activated on your switches or valves until the last man has personally taken off his LOCK.

Stretcher Cases

Corrosion Resistant not affected by acid or moisture—permanent finish, CONSPICUOUS, Vertical or horizontal mounting, white or yellow, Full size 95" high—9" diam.

Safety Council, American Standards Association, U. S. Department of Labor, insurance companies, and consulting engineers.

Automatic feed makes it unnecessary (but not impossible) for an operator to place his hand between punch and die. It is still necessary to provide a gate guard, enclose the ram, or limit its stroke to ¼ in. or less.

For some operations, semiautomatic feeds are used. Principal types are: chute, plunger, slide or push, sliding dies, dial, and revolving dies.

Two commercial protective devices adaptable to many operations are the sweep and pull-back types.

Sweep devices are best used on small presses. They are easily adjusted and give the same protection when the clutch fails as they do for a regular stroke of the press.

A flag of fiber or other material placed on the sweep arm helps to prevent an operator reaching around the device on one side, and on slow-moving presses, from putting his hand between punch and die after the sweep arm has swept past the center of the stroke.

Sweep devices are not effective on large presses.

Pull-back devices forcibly remove the operator's hands from the point of operation if he is out of rhythm with the machine. Cables connect the ram with wristlets on the operator's arms. As the ram descends, the hands are forcibly withdrawn.

The device must be adjusted to each operator and each job because of variations in arms, hands, and fingers.

Die design. On punch and forming presses it is frequently necessary to install guards of a different type for each set of dies used. For this reason, enclosure guards should always be considered integral parts of the dies.

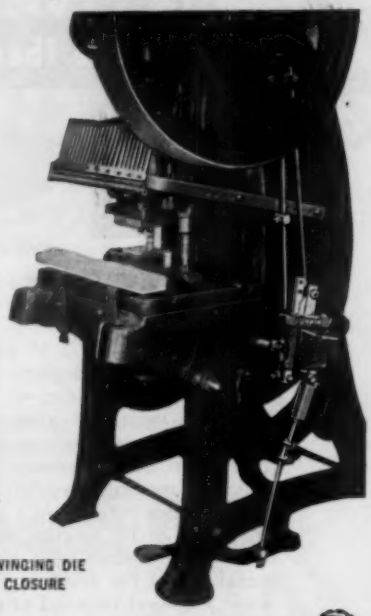
Feeding tools. Hand feeding tools are intended for pushing, placing, and removing materials in hazardous point-of-operation areas. These tools are made of soft nonferrous metal, such as aluminum or magnesium. They include pushers, pickers, tongs, tweezers, forks, and suction cups.

Circle Item No. 154—Reader Service Card

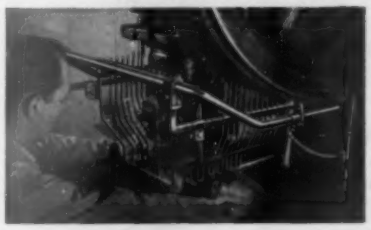
Cut Insurance costs with...

JUNKIN Safety Guards

Invest in safety—accidents cost money! Junkin Safety Guards for primary and secondary punch press operations afford maximum protection, increase press production and lower insurance rates. Swinging Die Closure is constructed to be adaptable to a variety of primary operations.



SWINGING DIE CLOSURE



INTERLOCKING BARRIER GUARD

Canadian Distributors: LEVITT SAFETY LTD., TORONTO

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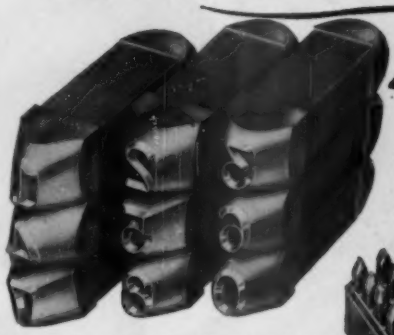
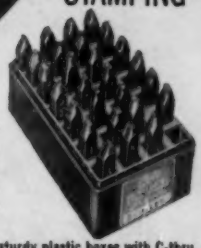
JUNKIN SAFETY APPLIANCES
3121 Millers Lane, Louisville 16, Ky.

Perfect GRIP...



FOR Toughest STAMPING



Knurled, wedge-shaped grip and precise balance make these ideal for the most severe stamping applications. Use of Mecco Safety Steel prevents spalling and mushrooming. *Write for Bulletin 504.*

Sets smaller than ¼" in sturdy plastic boxes with C-thru tops. Larger sets in compartmented wooden boxes.

Mecco SAFETY Wedge-Grip HAND STAMPS

A product of the Marking Device Industry

M. E. CUNNINGHAM CO.

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GUARDS ENCLOSURES CONTAINERS

. . . with ACROFLEX, the PLIABLE, NOTCHED STEEL STRAPPING

Your maintenance department will find Acroflex as handy as nails and wire. You'll use it to fabricate guards on all dangerous points of moving machinery. Acroflex consists of a series of angular connected links in 8′ or 10′ lengths, with each link pierced to reduce drilling when used with wire mesh or expanded metal. Used for fastening metal to metal, metal to wood, or wood to wood at right angles in numerous shapes.

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Call your Bullard distributor he has a mechanical one — that works better, is less costly, easier to install, and takes no maintenance. Pick up your phone right now, or write for literature.

BULLARD
INDUSTRIAL SAFETY EQUIPMENT

E. D. BULLARD COMPANY
SAUSALITO, CALIFORNIA

These hand feeding tools are not substitutes for guards and devices, but will help prevent hands from coming in contact with cutting edges and pinch points.

Electronic control devices. The photoelectric relay consists of a beam of light. When this is broken by the operator's hands, the start of completion of the ram stroke is prevented. The relay responds instantaneously, is automatic, takes up little space, is easily installed and economical to maintain. Its disadvantages are comparatively high installation cost and limited uses.

On presses with friction clutches, the ram travel stops immediately when the light beam is broken. This method is not effective on presses with positive clutches because the ram will continue its stroke until the end of its cycle. The guard should be operated from a closed electric circuit so that current interruption will automatically prevent the press from tripping.

Radioactive devices have been used on some power-press operations. The operator wears radioactive wrist bands. When his hands are in the protected area, the radioactive units are detected by Geiger tubes, and the press will not operate. Radioactive materials are within safe limits.

MECHANICAL APPARATUS INSPECTION

Check the points listed below. Make recommendations to cover unsatisfactory conditions so that they can be corrected promptly.

POWER TRANSMISSION ENCLOSURES OR GUARD RAILS	OK
Pulleys, flywheels	☐
Gears, sprockets, chains	☐
Belts: vertical, horizontal	☐
overhead horizontal	☐
Belt shifters	☐
Keys, setscrews, collars, couplings	☐
Shafting	☐
Clutches	☐
Lubrication facilities	☐
CONTROLS	
Electrical starting devices	☐
Lockout devices	☐
Tripping devices: foot, hand	☐
POINT OF OPERATION GUARDS	
In place	☐
Condition satisfactory	☐
Correct adjustment	☐

NSC Safety Instruction Card 778.

Power Transmission

Power transmission apparatus includes shafting, belting, pulleys, gears, starting and stopping devices, and other moving parts of equipment used in the mechanical transmission of power. Also included are prime movers, intermediate equipment, and other machines.

Power transmission parts, particularly in modern installations, contribute relatively few injuries. Nevertheless they can cause permanent disabling injuries and should not be neglected.

Individual motor drives and modern designs with moving parts enclosed have eliminated much guarding on the job. However, some guards still must be added when machines are installed.

Materials for Guards

Sheet metal, perforated metal, expanded metal, heavy wire mesh or bar stock may be used for most types of guards.

Transparent plastic is used where inspection of moving parts is necessary and the strength of metal is not needed.

Shatterproof glass is used in similar situations, particularly where illumination of guarded parts is essential and the flexibility of plastic is not required.

Where flying particles may mar safety glass or plastic, the surface may be protected by replaceable glass covers.

Wooden guards are relatively low in strength but are sometimes used where splashes and fumes from corrosive substances would attack iron or steel.

Aluminum or other nonferrous metals may be used where resistance to rust is essential or where machinery may be damaged by iron or steel.

Supervision

Frequent checks should be made to see that instructions are observed and that safety devices are functioning.

Operators occasionally make safety devices ineffective in an attempt to speed up production or make operation easier. This is especially

A FEW DOLLARS IN

AMPCO® SAFETY TOOLS

MIGHT HAVE PREVENTED THIS!

What if fire or explosion hit your plant tomorrow? Think of the damage that could be done—the lives and the time that could be lost! Unless you have money to burn, it's simply too expensive to gamble on going without the low-cost protection of Ampco Safety Tools in hazardous areas.

Factory Mutual Laboratories approve Ampco Safety Tools for use in many locations where a hot spark could mean paralyzing disaster.

Ampco has the world's most complete line of safety tools — more than 400 types and sizes — including the Ampco All-Purpose Bung Wrench (shown below) which fits 20 different closures.

Catalog ST-10 tells which Ampco Safety Tools to choose for your particular requirements. Write for free copy today.

AMPCO®

T-30A

AMPCO METAL, INC. Dept. 208C, Milwaukee 46, Wis.

West Coast Plant: Burbank, Calif. • Southwest Plant: Garland (Dallas County), Texas

In Canada: Safety Supply Co., Toronto, Ont.

Circle Item No. 159—Reader Service Card

PLAY SAFE!

Install a safety sentinel in your crane cab. ELECTRO-ALARM*, the original electronic crane warning device, alarms on proximity to dangerous high lines.

Frees operator from worry of overhead lines on voltages from 110 to 220,000 volts. Fail-safe features protects crew in event of failure of device itself. Device does not use photocells in its circuits.

Sold world-wide since 1948. NO PREVIOUS EXPERIENCE REQUIRED in electronics for maintenance crew to install device with our easy instructions.

GIVE YOUR RIG OPERATOR A SIXTH SENSE — LET ELECTRO-ALARM* WATCH THE HIGH LINES, WHILE HE WATCHES THE LOAD. Improves operator efficiency. A single line contact with your crane may cost several times the price of an ELECTRO-ALARM* in repairs alone! RAISE YOUR INSURANCE EXPERIENCE RATING NOW. INSTALL ELECTRO-ALARM*!

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FRESNO 5, CALIFORNIA

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USE THE MODERN Safety Drill Table

Saves fingers! Saves time! Replace your present drill table with the Modern Safety Drill Table—then drop in the work and drill. Eliminates dangerous, hand held, small jobs. Handles odd, irregular shapes and sizes without V-blocks, clamps or parallels. Sizes for every need, with diameters from 8" to 27½". Guaranteed to save its cost in labor alone in 6 months. Write for literature.

FREE TRIAL OFFER
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105

MODERN MACHINE TOOL CO.
2005 LOSEY STREET JACKSON, MICHIGAN

frequent with two-hand controls. Operators should be warned of the hazards involved and instructed in the use of safety devices. * * *

Electricity

—From page 207

Other types of wiring which may be used under certain circumstances include armored cable, non-metallic sheathed cable, flexible metal conduit (BX), and raceways. National and local wiring codes should be followed.

Aluminum wire. The current-carrying capacity of aluminum wire differs from that of copper wire, and the code should be studied prior to change in types of conductors used. For circuits it has generally been the practice to use an aluminum conductor two American wire-gauge sizes larger than a copper conductor.

Cords, Sockets, Lamps

Extension cords should be of a type listed by Underwriters' Laboratories and labeled to show compliance with the *National Electrical Code*. They should be inspected regularly. Kinking or excessive bending of cords should be avoided.

Ordinary lamp cord should not be used where it will be exposed to mechanical wear or to moisture—never for extension lamps in boilers, tanks, or on damp or metal floors.

Cord for portable tools and equipment is made in several grades.

For heating devices, such as electric irons and water heaters, cord requires an insulating covering containing flameproofing material such as asbestos fiber. It resists high temperature and moderate dampness.

Sockets should be of porcelain, non-conducting plastic, or rubber covered. Ungrounded metal-shell sockets are not recommended.

Extension lamps with 6-12 volt transformers are sometimes used where a shock of 110 volts might be fatal. Safe cords and lamp holders must be provided and maintained in good condition. Handles should be of non-conducting material and there should be no metallic connection between lamp guard and socket shell.

Circle Item No. 160—Reader Service Card

Because metal frames of portable electrical equipment should be grounded, cord with a green covered ground conductor should be used with a polarized plug and receptacle. If plant circuits do not have polarized receptacles, a third wire taped at intervals to the cord may be used. One end of the third wire is connected to the frame of the tool; the other end, which should be several feet longer than the cord, is clamped to a water pipe or other effective ground with a spring clip.

Employee training The safety program should include thorough training of employees who install or operate electrical equipment. In addition to instruction in the hazards of electricity they should be trained in first aid.

Of particular importance is knowledge of the mouth-to-mouth, and arm-lift, back-pressure methods of resuscitation. Distribution employees should also know the pole-top method.

Over-Current Devices

Fuses or **circuit breakers** should be installed in every circuit for protection of both personnel and equipment. These devices open the circuit automatically in the event of excessive current flow caused by accidental ground, short circuit, or overload.

A link fuse is a strip of fusible metal between two terminals of a

Where men work on machines each attaches his own padlock to the switch. Machine cannot be started until the last man has removed his padlock.

Circle Item No. 161—Reader Service Card

STOP COSTLY ACCIDENTS

Reduce Insurance Costs • Cut Time Loss • Save Lives!

install & use NEW MORRISON
STANDARD WHEEL GUARDS
. . . on your portable tools

STOP costly accidents with MORRISON Standard Wheel Guards! Safety codes and laws REQUIRE guard protection. Specify MORRISON for maximum safety . . . lighter weight . . . lower cost . . . greater strength. Full protection for operator with minimum interference with work.

Remember, MORRISON also makes revolving cup guards. There is a MORRISON Guard for every application . . . all are made to comply with American Standard Safety Code.

SEE YOUR GRINDING WHEEL SUPPLIER OR WRITE:

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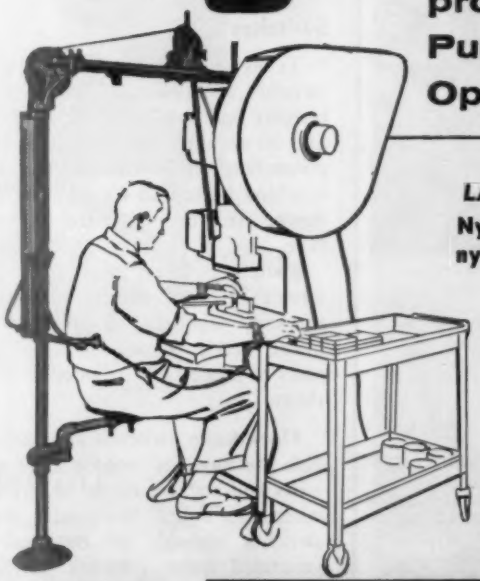
POSSONS SAFETY DEVICES
protect your
Punch Press
Operators



LATEST IMPROVEMENTS
Nylon covered cable and nylon wrist bands upon request.

For free aisle space, use our beam or ceiling attached type. Applicable to Punch Presses; Press Brakes; Embossing Presses; Toggle Presses and Drop Hammers, as well as special machines.

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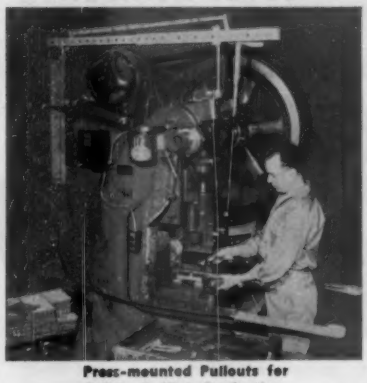
SAFEGUARDS
for ANY
Punch Press Safety Program



Press-mounted Pullouts for Safety & High Production

Pre-fab. Die Enclosure Material for a quick low-priced Die Enclosure Program

Traveling Barriers for Automatic Dual Protection

Whatever your preference in press guards, let Safeguard help solve your problems.

For information on—

1. Pullout Guards
2. Electronic Monitors (Insures the use of pullout guards)
3. Individual Die Enclosures
4. Adjustable Die Enclosures
5. Fixed Cable Guards (For no hands in the die feeding without enclosures)
6. Traveling Barrier Guards
7. Riveter Guards

Write or call today.

SAFEGUARD Mfg. Co.

Woodbury, Conn. Congress 3-3385

fuse block. If exposed, it may scatter hot metal when it blows.

The explosion fuse is used in central stations, powerhouses or on overhead lines. When it blows, the gases generated quench the arc.

Plug fuses are used on circuits which do not exceed 30 amperes at not more than 150 volts to ground. The type which cannot be bridged inside the holder is recommended.

A cartridge fuse has a fusible metal strip enclosed in fiber tubes. Available are those which indicate when the fuse is blown and the refillable type in which fusible elements may be replaced.

Insulated fuse pullers should be kept on hand for pulling and replacing fuses. In installations complying with the code, fuses are protected by a switch which de-energizes the fuses when opened. If the fuse is not protected by a switch, the supply end of the fuse should be pulled out first, and in replacing, the supply end should be inserted last.

Circuit-breakers are used in high voltages or large current capacity circuits and are becoming more common in many kinds of circuits. They may be instantaneous in operation, equipped with timing devices, manually or power operated.

Switches

Types of switches include snap switches, knife switches, enclosed externally operable air-break switches, and oil switches. Those designed for controlling individual motor and machine tools and for lighting and power circuits are of the enclosed type.

Switches, fuses, and automatic circuit breakers should be plainly marked, labeled, or arranged to afford ready identification of circuits or equipment supplied through them.

Open-knife switches are undesirable because of exposure of live parts and because of the arc formed when the switch is opened. Knife switches should be enclosed in grounded metal cabinets having a control lever extending through a slot in the cover.

Oil switches have contacts which operate while submerged in oil. They are especially desirable in circuits of 750 volts or more and may be used also in lower voltage circuits.

Snap switches, such as push-button or toggle types, have live parts enclosed. Flush switches should be installed in metal boxes, and surface switches used in open wiring and moulding work should be mounted on porcelain or plastic sub-bases. These switches should indicate whether the circuit is open or closed.

Snap switches are preferable to key or pull-chain sockets. Key sockets, if used, should be porcelain, plastic, or other nonconductive material. Pull-chains should contain nonconductive links.

Insulated floors. Protection against accidental shock from live electric parts, such as switchboards, fuse panels and control equipment, is obtained by insulating the floor area within reach of live parts.

For low-voltage exposure, dry wood floors without metal parts, or insulating mats, may be used.

Power Saws

Circular saw. The circular table saw is one of the most useful of woodworking power tools—and one of the most dangerous. It causes more permanent disabilities than any other machine in the wood-

CONDITIONS CAUSING FALLS

Falls are the second largest cause of accidental death. *Watch for these hazards:*

- Slippery, wet, oily and worn floors
- Ice and snow on walks and platforms
- Stumbling hazards
- Loose material under foot
- Worn or broken treads on stairs
- Insecure scaffolds and platforms
- Stairs, scaffolds and platforms with no handrails
- Defective ladders or ladders not suited to the job
- Open elevator shaftways
- Unguarded floor openings and manholes

NSC Safety Instruction Card 185.

Circle Item No. 165—Reader Service Card

working industry and among do-it-yourself fans.

A crosscut saw should not be used for ripping nor a rip saw for crosscutting.

The following important points should be observed:

1. Saw must be equipped with a hood that will cover it to at least the depth of the teeth.
2. Hood must automatically adjust itself to thickness of stock and ride on the stock.
3. Exposed portion of saw blade under table must be guarded.
4. Guards should be designed and constructed to avoid vibration.
5. All teeth should be even in length.
6. Blade should not be warped or out of round.
7. Depth, size, and shape of gullets should be such as to let sawdust discharge freely. Bottom of the gullet should be round.
8. The circular saw has to cut a kerf thicker than the blade to give clearance which permits the saw to pass through the stock.
9. Saw must be discarded if it has a crack, unless diameter is reduced to eliminate crack and tension is corrected.

Swing cutoff saws. Swing cutoff saws must have device to return the saw automatically to back of table when released at any point. Fiber rope or cord must not be used in device.

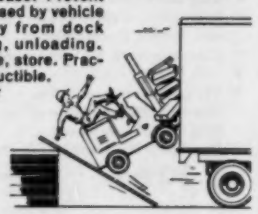
Limit chains, positive stops, or table extensions must be provided to prevent saw from swinging beyond front edge of table.

Where it is possible to pass behind a swing cutoff saw, rear of saw must be completely housed when saw is in back position. Housing must include swing frame as well as saw.

Manual-feed ripsaw. A spreader must be provided to prevent pinching or binding, which is a major cause of kickbacks. It must be slightly thinner than the saw kerf and slightly thicker than the saw disk.

Antikickback fingers (dogs) should be designed and installed so as to be effective for material of all thicknesses. * * *

Safety Wheel Blocks are light, strong, tough because they're **STEEL CASTINGS.** Hold heavy trucks, trailers with ease. Prevent accidents caused by vehicle moving away from dock while loading, unloading. Easy to handle, store. Practically indestructible. Stocked for Immediate Delivery



$10.95 ea. 1-5 Blocks
$9.95 ea. 6 or more
F.O.B. Hammond, Ind.

Order now for immediate delivery! Write for illustrated catalog.

CALUMET STEEL CASTINGS CORP.
1638 SUMMER STREET • HAMMOND INDIANA

Table weighs 2700 pounds

with SAFETY and ECONOMY

VAC-U-MATION SHEET LIFTERS shorten man-hours, cut handling costs, pay for themselves F-A-S-T. Models available from manually-operated units to completely automatic models with capacities for handling up to 2,000 lbs.

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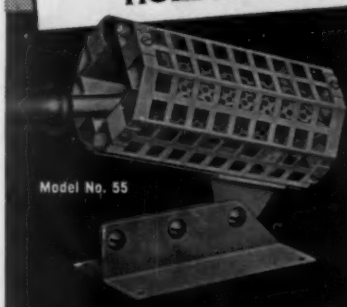
VAC-U-MATION DIVISION
4185 Ravenswood Avenue, Chicago 13, Ill.
District Offices: Detroit and Cleveland

SOLDER WITH SPEED AND SAFETY
FIRST WILDER IN QUALITY
ADJUSTABLE SOLDERING IRON HOLDERS



Model No. 55

You can place these well designed soldering iron holders at any desired angle, and mount them either on top of or under the work bench. Or, pair a No. 55 and No. 53, with special slide attachment. Three sizes fit most irons. Wiping pad and clamp available.

Write for Complete Information

WILDER
MFG. CO., INC. PORT JERVIS, NEW YORK

Circle Item No. 164—Reader Service Card

Circle Item No. 166—Reader Service Card

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LEWIS SAFETY KNIFE

- With automatic blade guard. Blade hidden when not in use. Pressure on any surface gives cutting action.
- May be carried in pocket safely.
- Rust-proof. Unbreakable, die-cast zinc. Bright chrome plated.
- Complete with 5 shatterproof blades.
- 5¾" long.
- Weight per dozen, 4 lbs.
- Used by Major National Companies and U. S. Government.

Write today for complete knife catalog.

$1.50 ea. with Belt Holster...1.75
5 Blades . . . 50¢

FLASH MANUFACTURING COMPANY
169 Murray St. • Newark 5, N. J.
Seal-o-matic of Canada, 2 Matilda St., Toronto

Lubrication for High Speeds

OPERATING at high speeds on countless bearings, modern machines need lubrication at frequent intervals. New lubricants and central pressure lubricating systems have been developed to meet these needs.

Such an important part of a preventive maintenance program as lubrication should be handled on a definite schedule.

Lack of lubrication results in hot bearings, shutdowns, and fires.

Over-oiling motor bearings causes oil to drop or be thrown on insulation of electrical wiring. Oil deteriorates the insulation, exposing live conductors that will arc and cause fires or electrically charge ungrounded surfaces. Oil on the floor creates slipping and fire hazards.

A survey of plant equipment will determine lubrication requirements. This information should be entered on machinery records.

Commonly used lubrication methods are:

1. Capillary oilers.
2. Wick oilers.
3. Ring and chain oilers.
4. Gravity feed oilers.
5. Pump feed oilers.
6. Cartridge oilers.

Some machines have hundreds of remote bearings, and these can be served efficiently and economically by centralized systems. Clean oil or grease is supplied under pressure from the central pumping unit to every bearing.

The lubricant is renewed as often as the machine and operation require. This may be once or twice each shift or several times an hour.

On some systems an indicator signals delivery to each bearing of the correct amount of oil.

With a central pressure system there is no need to stop the machine for lubrication. The hazardous job of crawling over machines is eliminated.

Pressure lubrication systems require special greases. Silicone grease, one of the newer lubricants, has shown unusual ability to stand up under high speeds and high temperatures.

Older Installations. New machines usually have built-in lubrication systems. Older installations were designed for the oil can, and it may not be practicable to add an automatic system. In such cases one or more of these methods may be used for reaching remote bearings:

1. A service platform or runway giving access to several bearings. Moving parts of machinery should not project over platforms. If this is unavoidable, these parts should be enclosed.
2. A small car suspended from an overhead I-beam enables the oiler to travel parallel to the line shaft and reach bearings.
3. Long-spout gravity flow or force-feed oil cans enable the oiler to stand in the clear. Some cans have spouts long enough to reach overhead line-shaft bearings from the floor.
4. Oil reservoirs at individual bearings with control devices operated with hand poles.
5. Extension pipes on bearings where grease or oil cups are in the danger zone. These may not be practical where low temperatures make it difficult to force oil or grease through the pipes.

Power Press Guards

Protect Operators • Increase Production

Wiesman cam-action press guards enable operators to work at top speed without fear of accident. Guarding is effective and completely automatic . . . does not hamper operator's vision or movement. For all sizes and styles of presses. Used by hundreds of firms. Inexpensive . . . easy to install.

Over 30,000 sold

Write for descriptive folder and 30-day FREE trial offer.

Name_____
Address_____
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31 South St. Clair Street • Dayton 2, Ohio

Let **KEY-BAK** HELP CUT DRILL-PRESS ACCIDENTS

Attach SAF-T-CHUCK KEY-BAK to all drill-presses. Chuck key is always handy; SAF-T-CHUCK key springs out when released. It can NEVER, NEVER, NEVER be thrown from the whirling chuck. MODEL 7SK, $4.45 complete with #3 key. Key available in ten sizes.

$4.45 RETAIL

KEY-BAK KEY REEL

Wear regular KEY-BAK Key Reel on your belt. Pocket watch size, high-polished chrome finish. Swedish clock spring reels in 24" long stainless-steel chain. NO DANGEROUS, DANGLING CHAINS TO CATCH IN MACHINERY AND CAUSE ACCIDENTS. For your shop and maintenance-men. Order now!

$2.95 RETAIL

ORDER FROM YOUR JOBBER — OR WRITE DIRECT!

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CTL Company
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Wausau, Wisconsin

OVER TWO MILLION KEY-BAKS SOLD!

SECTION 9

PLANT PROTECTION

IN SECTION 9:

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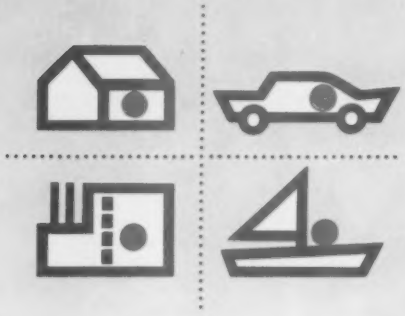
INDUSTRIAL BUILDINGS are involved in a large proportion of the heavy-loss fires reported each year. Each day nearly a hundred industrial plants suffer serious damage from fire. Of those destroyed, some 40 per cent are out of business permanently. The cost of replacement of plant and equipment is often prohibitive.

The fire-safe plant has: fire-resistive construction, limitation of fire areas, segregation of hazardous storage and processes, protection of openings in walls and between floors, automatic system of detection and extinguishment, and portable apparatus.

What else?

Men trained in extinguishment and rescue work who will instinctively do the right thing in an emergency.

To fight fire faster, Ansul has introduced a dramatic new concept in fire extinguisher design—the unique MONITOR dry chemical unit. Created to fill a basic need for low cost, effective first-aid fire protection, MONITOR packs the fire-killing power of 8 ordinary carbon tet units or a 1½ gallon foam extinguisher. Exclusive features include a disposable recharge shell . . . U.L. Listed recharge unit . . . space-saving spherical shape . . . simple operation. MONITOR comes in red or white for maximum visibility in any location. Your Ansul man has complete details on this dramatically different first-aid fire extinguisher.
ANSUL CHEMICAL COMPANY, MARINETTE, WIS.



new products, new ideas for better fire protection

ANSUL

FIRE FIGHTING EQUIPMENT
REFRIGERATION PRODUCTS
INDUSTRIAL CHEMICALS

Fire Protection Principles

Applications that guard life and property

Central station is nerve center of a plant fire protection system. Above the switchboard is a directory from which operator can determine location of fire when alarm comes in. (National Cash Register)

INDUSTRIAL operation involves many processes that require flame or high temperature and many materials that are flammable or will react violently under certain conditions. The majority of fires in industry can be traced to four general causes:

1. *Open flames, high temperatures:* Stoves, furnaces, welding and cutting, salamanders, lamps, heated pipes and surfaces, matches, smoking.
2. *Friction:* Hot bearings, belts, cutting, grinding.
3. *Electricity:* Defective wiring, arcs, sparks, heat resistance, static electricity.
4. *Chemical reactions:* Spontaneous ignition, reagents, acids, oxidizing agents.

Fire prevention engineering. A qualified engineer will often be helpful in planning prevention and protection measures.

First step is a survey of the plant —layout, manufacturing processes, materials handled, storage methods, and fire protection facilities.

With this information, plans can be made for improving structure and layout, installing additional equipment where needed, and training employees in prevention and extinguishment.

The familiar "fire triangle" often used in training classes illustrates the three elements necessary to produce combustion—fuel, heat and air. Elimination of one of these eliminates the fire.

Many types of apparatus have been developed for various risks, but all use one or more of the three principles of extinguishment:

1. *Eliminate oxygen from the air*—Replace air with inert gas; exclude air with a noncombustible cover; use a chemical which will dilute the oxygen in the air below the point that will support combustion.
2. *Remove fuel supply*—Shut off flow in liquid or gas supply lines; remove burning fuel by mechanical or other means.
3. *Reduce temperature below ignition point*—Cool burning material with water or other chemicals.

Water supply. Water is the most widely used and effective extinguishing medium for most fires. A plant may secure its supply from the following sources:

1. City or water district mains.
2. Lakes, ponds, rivers, surface reservoirs, or similar sources.
3. Pressure tanks containing water under pressure for forcing water into the piping system.
4. Elevated tanks or reservoirs.

Pumps should supply enough streams at adequate pressure. Allowance should be made for pumps out of service for repairs and for continuity of pumping in event of power failure.

Hydrants should be located throughout the plant area to give adequate coverage of all buildings, and preferably not more than 50 ft. from any building.

Maintenance must be systematic. When hydrants are installed, provide drainage to minimize the danger of freezing in cold weather. Hydrants should be kept clear of snow and a thawing device provided.

Standpipe and hose provide effective protection inside buildings when used by men trained in han-

To page 244

FIVE ESSENTIALS OF FIRE PROTECTION

1. **Fire prevention engineering**
2. **Regular, periodic inspection**
3. **Damage control—limit damage due to fire and fire extinguishment**
4. **Early detection and extinguishment**
5. **Prevention of injuries from fire or panic**

←Circle Item No. 170—Reader Service Card

Portable Fire Extinguishers

The plant's first line of defense

PORTABLE fire extinguishers can be brought into action in the vital minutes before the company or city fire department can reach a blaze —sometimes even before sprinklers operate. Their prompt use of extinguishers by trained employees has prevented heavy losses.

Limitations of portable extinguishers should be recognized in planning protection. Such devices require use by skilled operators in initial stages of a fire and are no substitute for automatic protection.

On no account should an alarm be delayed. If only one man is present, the alarm should be sent before using an extinguisher. If several persons are present, one should turn in the alarm while others fight the fire.

Classification of Fires. Unfortunately, there is no single type of extinguisher which is effective on all types of fires. Considerable care is needed in selecting the proper extinguisher. As outlined in National Fire Protection Association Pamphlet No. 10 there are three general classes of fires:

221. For all practical purposes, there are three general classes of fires:

(a) *Class 'A' Fires,* defined as fires in ordinary combustible materials such as wood, cloth and paper where the 'quenching-cooling' effect of quantities of water or solutions containing large percentages of water is most effective in reducing the temperature of the burning material below the ignition temperature and is, therefore, of first importance.

(b) *Class 'B' Fires,* defined as fires in flammable petroleum products or other flammable liquids, greases, etc. where the 'blanketing-smothering' effect of oxygen-excluding media is most effective.

(c) *Class 'C' Fires,* defined as fires involving electrical equipment where the electrical nonconductivity of the extinguishing media is of first importance.

Types of extinguishers in general use are:

1. Water type
   a. water pails
   b. pump tank
   c. stored pressure
   d. cartridge actuated
   e. soda acid
   f. loaded stream
   g. anti-freeze
2. Vaporizing liquid
   a. hand pump or stored pressure extinguishers using carbon tetrachloride or "CBM" (chlorobromomethane).
   b. high vapor pressure types. These extinguishers use a vaporizing liquid having a high vapor pressure such as monobromotrifluoromethane. (These extinguishers are not yet available for general use).
3. Foam
4. Carbon dioxide
5. Dry chemical
6. Extinguishers for metal fires.

This article was reviewed by Allen L. Cobb, Director of Industrial Safety, Kodak Park Works, Eastman Kodak Company, Rochester, N. Y.

Representative types of portable fire extinguishers. (American La France)

Class "A" Fires

These extinguishers should be used only on Class "A" fires in ordinary combustible materials, never on flammable liquid or grease fires. They may be used on fires in electric equipment when the power is positively shut off.

Water Pails. The most useful type is the 12-qt. size with flat bottom made of 24-ga. galvanized iron. They are sometimes placed in water casks holding a number of pails which may be removed, full of water in quick succession.

If calcium chloride anti-freeze solution is used, pails should be coated inside first with red lead then with asphalt base paint. For casks, they must be coated on both sides.

Pump Tanks. These are covered containers usually cylindrical with a double action pump and discharging through a short length of hose and a nozzle. Such extinguishers have the advantage that they may be refilled immediately or even while in use. They are simple and easily understood, especially useful on deep-seated glowing fires where the ability to use water judiciously a little at a time is an advantage. They may be filled with plain water or with anti-freeze solutions.

Stored Pressure. The stored pressure extinguisher is simply a cylindrical tank usually holding 2½ gals. of water which is expelled by stored gas or air pressure. They are commonly equipped with squeeze-grip discharge valve and a pressure gauge to indicate the pressure in the extinguisher.

Such extinguishers are easily operated and can be used intermittently like the pump tank. They may also be used with non-freezing solutions. Larger sizes are on wheels.

Cartridge Operated. This is similar to the stored pressure extinguisher except it is equipped with a small sealed cylinder of carbon dioxide gas with a seal that is punc-

HOW TO SELECT A FIRE EXTINGUISHER

	Carbon Dioxide	Dry Chemical	Foam	Pails & Casks	Stored Pressure and pump tank	Soda Acid	Loaded Stream	Vaporizing Liquid CC/4 or CBM
Class A—wood, cloth fibers, plastics, paper etc.	Very small surface fires only	Very small surface fires only	Surface fires	Yes	Yes	Yes	Yes	Small fires only
Class B—flammable liquids	Yes	Yes	Yes. Except water miscible liquids	No	No	No	Small fires (½B rating)	Small fires only
Class C—a Class A fire with added hazard of live electric circuits	Yes	Yes. Except damages delicate electric equipment	No	No	No	No	No	Yes. High temperature of arc causes breakdown to toxic products
NFPA or UL classification of extinguisher	1 B, C up to 12 B C	4 B C up to 40 B C	1A, 2B up to 20A, 20B	1 A and 2 A	1A up to 20A	1A up to 20A	1A, 2A, ½B up to 20A	½B C up to 1 B C
Subject to freezing	No	No	Yes	Yes. Except with anti-freeze	Yes on C with anti-freeze	Yes	No	No
Extinguishing Agent	Carbon dioxde	Dry chemical	High water content, foam	Water	Water	Water	Water plus metal-alkali salt	Carbon tetrachloride. CBM etc.
Range	3-8 ft.	5-25 ft.	25-35 ft.	6-8 ft.	20-40 ft.	20-40 ft.	20-40 ft.	5-10 ft.

tured when the extinguisher is operated. It cannot be used intermittently like the stored pressure type. It may be used as an anti-freeze extinguisher and may hold pressure better than the stored pressure type over long periods.

One variation of this extinguisher makes use of alkali-metal-salt solutions and is known as the "loaded stream" extinguisher. This forms a non-freezing solution which may be used in temperatures as low as —40 F. This extinguisher is slightly more effective on Class "A" fires than plain water and has a limited usefulness on flammable liquids. Larger sizes are on wheels.

Soda Acid. The soda acid extinguisher is an older style of water type extinguisher in which water is forced out by gas pressure generated when the extinguisher is inverted, allowing sulfuric acid in a loose stoppered bottle to mix with sodium bicarbonate solution.

Such extinguishers are somewhat clumsy to operate because of the necessity of inverting the extinguisher and holding the hose at the same time but are reliable if in good condition and if properly recharged annually with the manufacturer's approved charges. This extinguisher discharges completely, once inverted.

One variation of this extinguisher makes use of alkali-metal-salt solutions and is known as the "loaded stream" extinguisher. This forms a non-freezing solution which may be used in temperatures as low as —40 F. This extinguisher is slightly more effective on Class "A" fires than plain water and has a limited usefulness on flammable liquids. Larger sizes are on wheels.

Class "B" Fires

Dry Chemical. This extinguisher contains a dry chemical powder, essentially sodium bicarbonate treated so it will remain free-flowing even when exposed to moisture over long periods.

The dry chemical is expelled by gas or air pressure which may be from a gas cartridge or from air or inert gas stored in the extinguisher shell. All but the smallest types have a flexible discharge hose and nozzle; larger types are on wheels.

The exact nature of the extinguishing effect is not fully understood, but is primarily a "blanket." This extinguisher is particularly effective on flammable liquid fires, including water-miscible liquids.

It is not effective on Class "A" fires except for small surface fires. While non-corrosive, the dry chemical powder is difficult to clean from delicate electrical and electronic equipment and should be used on such equipment only as a last resort.

In recharging, use only products recommended by the manufacturer.

Carbon Dioxide. Portable carbon dioxide cylinders consist of a storage cylinder, a discharge horn and hose. In smaller types, the flexible discharge hose may be replaced by a rigid connection. Larger types are provided with wheels.

These extinguishers discharge liquid carbon dioxide that vaporizes to form an inert gas cloud which may be used to smother a fire. In addition, there is some cooling effect from the solid carbon dioxide "snow."

The blanketing effect is limited to the time a gas cloud can be maintained over the surface of the liquid. These extinguishers are not effective for Class "A" fires except for small surface fires. The gas is non-corrosive, non-toxic (except it excludes oxygen and may be dangerous in confined spaces) and does not leave a residue. It will not damage delicate electrical equipment, fine metal surfaces or food products.

Because of its short range, limited discharge time, and hazards that

may be created by using it on flammable liquids at *too short* range this extinguisher requires skill and experience in its use—probably more than any other extinguisher. It is, however, remarkably effective in the hands of an expert.

Foam. The foam extinguisher resembles the soda-acid type in outward appearance and method of operation. Its special charge contains a foaming agent.

When discharged, a wet foam is produced which is about eight times the volume of liquid in the extinguisher. When allowed to fall gently on a liquid surface, a foam pile builds and spreads over the liquid surface, smothering a fire.

The foam is broken down by the action of water-miscible liquids such as alcohol and is not suited to these materials. It is effective on petroleum-type liquids such as gasoline. The blanket persists and keeps the fire from re-igniting.

This extinguisher will also handle surface fires in Class "A" material but is not often recommended for this purpose, as it is difficult to clean and will damage many materials. It is a good conductor of electricity and should not be used on electric equipment.

Considerable training is needed so operators will remember to have the foam drop gently on the liquid surface from a distance, usually using the far side of the tank on fire, or some other surface as a "backstop."

In recharging, use only recommended charges.

Vaporizing Liquid. These extinguishers contain a halogenated hydrocarbon such as carbon tetrachloride or chlorobromomethane (CBM). Vapors from these liquids form an inert gas blanket which has a smothering effect on flammable-liquid fires. The material has a cooling effect, much less than that of water. These agents will not freeze or conduct electric current.

While in extensive use at one time, vaporizing extinguishers have been largely replaced by more effective types. Another disadvantage of this extinguisher is the toxicity of the vapor. These hazards are outlined in NFPA pamphlet No. 182-M. In general, although there are appreciable differences in the toxicity of commonly used vaporizing liquid agents, all may be dangerous to use in confined areas.

These extinguishers range in size from one qt. to two gals. The agent is expelled by hand pump or stored pressure. Only approved liquids should be used in recharging, as the extinguishers are damaged by corrosion by commercial grades of these hydrocarbons.

In recent years, other vaporizing liquid agents have been developed which show considerable promise, such as monobromotrifluoromethane These materials have a high vapor pressure so the extinguisher resembles the carbon dioxide type in appearance, method of use and extinguishing effect. They have proved effective for aircraft use where lighter weight and greater extinguishing effect offer advantages over carbon dioxide and dry chemical.

At present, the cost of these agents has limited their usefulness to specialized applications, and approved types are not yet available for industrial use.

For Metal Fires. A number of specialized extinguishers are available for use on fires in certain metals, as for example, magnesium. Selection of the proper type of extinguishing agent for metal fires is a specialized undertaking, as the effectiveness of the extinguisher will depend on the form, extinguishing conditions and composition of the metal. The advice of a competent fire protection engineer should be obtained, as well as specific recommendations from the manufacturer.

—*To page 236*

Fire blankets should be quickly available wherever flammable materials are handled.

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Approved Equipment for Industrial Fire Protection.

Underwriters' Laboratories, Inc.

Fire Protection Equipment List.

Electrical Appliance and Utilization List.

Hazardous Location Equipment List.

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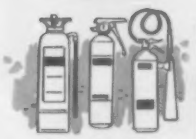
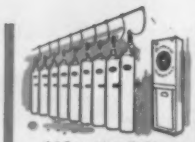
An integrated network of 47 Globe automatic sprinkler systems, linking 14,500 individual Globe sprinklers, protects the modern Chicago plant of Automatic Electric Company. Automatic Electric is the nation's largest producer of equipment for America's independent telephone companies. Recently the company relocated all of its office, research and manufacturing activities in a handsome new 1,520,000 sq. ft. plant at Northlake, Illinois. The dependable, carefully-engineered Globe equipment at Automatic Electric constitutes one of the largest fire protection systems ever installed in U. S. industry.

Globe is one of 9 famous brands of fire protection equipment offered by The Fyr-Fyter Company. All of Fyr-Fyter's 1200 products are available from Fyr-Fyter, Pyrene-C-O-Two and Buffalo industrial distributors. Look for their local listings in your Yellow Pages under "Fire Protection Equipment." Or write to The Fyr-Fyter Company, Dayton 1, Ohio.

AUTOMATIC ELECTRIC COMPANY


Fyr-Fyter, Pyrene-C-O-Two, Buffalo fire extinguishers


C-O-Two carbon dioxide, dry chemical, foam systems

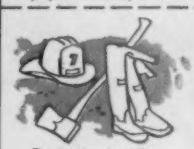
Globe sprinkler systems

Fyr-Fyter fire alarm systems

Municipal, industrial fire hose

Hose and extinguisher cabinets

Wooster brass fire equipment


Fire department supplies

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Is your plant

next?

If you've ever thought that this couldn't happen to your plant, a few facts may quickly change your mind. It can and *does* happen to 305 industrial plants every day! Staggering? — so are the losses, $52,260,000 worth every year.

But your plant needn't be chalked up as just another statistic. You can do something about it!

It's a known fact that one of the main reasons small fires become blazing infernos is — *the delay in reporting a fire or immediate notification to the local fire department.* The chart below is a grim, factual reminder of . . .

What happens when an alarm is delayed*

Property	Minutes Delayed	Reason for Delay	Loss†
Creamery		Could not find alarm box	$75,000
Woodworking plant		Discovered by passerby	$101,000
Wire & cable plant		Employee tried to extinguish	$395,000
Ore refinery		Employee tried to extinguish	$250,000
Lumber yard		Employee tried to extinguish	$150,000
Rubber plant		Fire destroyed telephone	$100,000
Rubber warehouse		Telephone alarm, wrong address given	$55,000
Metalworking plant		No alarm system	$245,000

†Includes loss of buildings, material and equipment, but not loss of business records and other intangibles.

What you can do

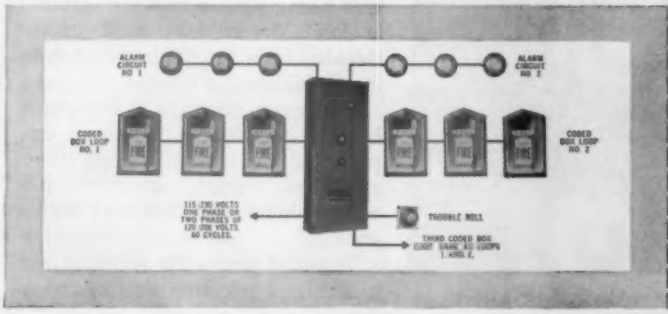
Provide your plant with *complete* protection with a Gamewell FLEXALARM system that *identifies* the *zone location* of the fire and one that can be *directly connected* with the *Municipal Fire Department.*

A FLEXALARM system can be pre-engineered to meet the precise needs of your plant. FLEXALARM is available as a coded or non-coded system, semi or completely automatic, with practically limitless possible combinations of annunciators, special drill, test and alarm features. For example, it can be tied into the municipal alarm system at the curb; integrated with the sprinkler system; or automatic fire detection devices. It's simple to specify, easy to install, efficient and economical.

Gamewell will be happy to assist with fire detection engineering of new construction, expansion or modernization if desired. It's a service that gives you the benefit of over 100 years' experience with fire protection systems. Specify Gamewell . . . for maximum protection at minimum cost. Write THE GAMEWELL COMPANY, 1299 Chestnut Street, Newton Upper Falls 64, Mass.

*Facts on chart, itemized by The Gamewell Company, were taken from an article entitled "The Easiest Help Your Competitor Ever Got," in the May-June, 1959, issue of MODERN PLANT AND OPERATION MAINTENANCE. Reprints of this article may be obtained by filling out the coupon below.

A typical FLEXALARM Coded System Upwards of 25 coded boxes can be placed on any one loop circuit. Battery ensures alarm signal in case of electrical failure. When an alarm box is pulled, a signal is sounded, identifying the zone location of fire. Through a Master Box this system can be directly connected to the Municipal Fire Department.



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- ☐ Have a Gamewell Fire Protection Engineer call.
- ☐ Send me a Gamewell Fire Alarm System Planning Guide.
- ☐ Send a reprint of article "The Easiest Help Your Competitor Ever Got."

Name.....
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Automatic Protection

Systems for fire detection and extinguishment

THE WELL-PROTECTED PLANT supplements the skill and vigilance of plant guards and watchmen with automatic systems for detection, warning and extinguishment and supervisory systems for watchmen.

Alarm systems range from coded blasts on the factory whistle to intricate automatic systems.

Sirens or special whistles are often used to avoid confusion with the regular whistles.

Where municipal fire protection is available, an alarm box connected with the city fire department may be located near the plant entrance or in one of the buildings. Auxiliary boxes may be placed at strategic points.

A direct connection to the nearest fire station offers important protection. Such a system may be operated manually or by a water alarm device.

Supervisory Systems

Watchmen's supervisory systems transmit and record signals made at watchmen's key stations. This protection is frequently combined with fire-alarm systems and supervision of sprinkler systems. A plant guard's failure to check in at any station along his route is promptly recorded at the control desk or panel.

Such supervision has checked many incipient fires, prevented robberies, and brought aid to watchmen rendered helpless by accident or illness. It has also prevented sprinkler-caused water damage.

These operate on three main plans:

Central station system. Signals are transmitted to an independent central station where they are recorded and proper action for the emergency taken. The central station may serve several companies.

Proprietary system. Similar to a central station but controlled and operated by the owner of the protected property.

Local system. Owned and operated by the protected company but does not have an operator constantly on duty at a central station.

Detectors and Alarms

Automatic detection and alarm devices may be operated by heat or smoke.

Heat-actuated systems are of two types: Temperature-rate-of-rise, or fixed thermostat.

Temperature-rate-of-rise systems operate on the principle that air expands when heated. Tubing contains air at atmospheric pressure. Heat of fire expands air, forcing it to travel in opposite directions to diaphragms which close and sound alarm. Features in design prevent false alarms from normal temperature changes or even short sudden surges of heat.

Fixed-temperature thermostats are set for some specific temperature well above normal. When room temperature reaches that level, an alarm is sounded.

Smoke detectors detect deep-seated smoldering fires and give a signal before flames are visible. Continuous samples of air are drawn from protected spaces and passed through an analyzer tube. Here smoke passes through a beam of light. Smoke reflects light on to photoelectric cells, increasing the cell output and sounding an alarm.

Nuclear detectors are sensitive and quick-acting. Combustion generates minute and invisible products not detectable at first by the human senses or by conventional detectors. In a nuclear detector a radioactive element in a ceiling-mounted chamber operates when there is a change in ionized air. Heat or smoke causes this change and sends the alarm signal to a monitor panel.

Checking valves which control automatic sprinkler system.

Automatic Sprinklers

FIXED SYSTEMS, particularly automatic sprinklers, are rated as the No. 1 defense against fire. They are needed wherever a building or its contents provides an appreciable amount of combustible material. Even fireproof buildings need protection for combustible contents and to prevent structural damage.

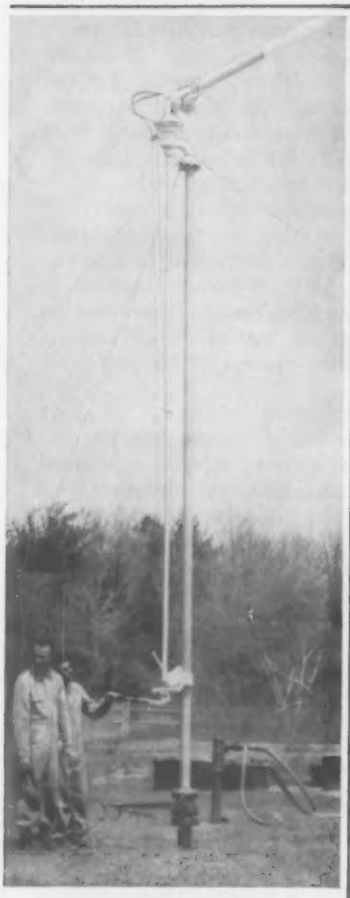
Sprinkler heads should be located not only to protect open areas but also under wide benches or tables, in closets, dryers, and other locations shielded from the discharge of ceiling sprinklers.

This extra coverage is important because heat from a fire in an unprotected area would open more sprinklers, causing drain on the water supply and excessive water damage.

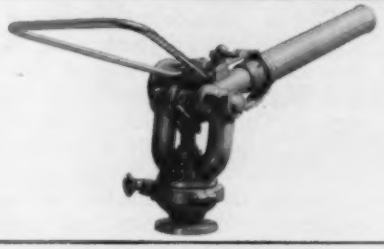
Essential parts of a sprinkler are a nozzle, a releasing device, and a

Most Complete Line of Specialty Turrets on the Market!

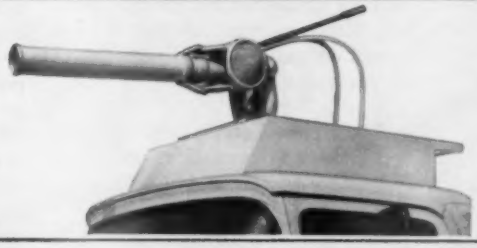
...All Rockwood Turrets Discharge FogFOAM
Solid FOAM Stream — WaterFOG — Solid Water Stream



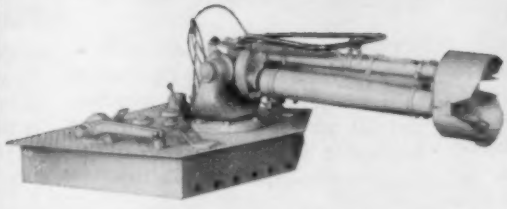
Extended Manual Control Type — Turret nozzles extend 10 to 20 feet above remote control station on deck or ground on standard units . . . greater remote extensions for special applications.



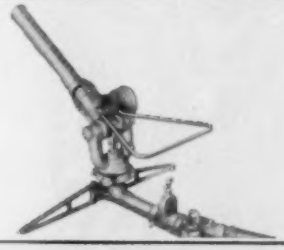
Direct Manual Control Type — Gives fire fighters "out-in-the-open" control from cab roof!



Remote Manual Control Type — Easily handled by man in driver's seat. Ideal for fast action!



Remote Hydraulic Control Type — Power-controlled from within the cab. Single and dual models. Widely used on air crash rescue fire-fighting trucks.



Portable Type — Off the truck and into action in seconds! Goes wherever a fire fighter can bring the proper hose line into action!

On the truck or on the ground, fire fighters can hit fires *harder* using ROCKWOOD Turrets! At airports and refineries . . . in municipalities and throughout industry . . . these advanced-design fire-fighting aids are constantly proving their ability to extinguish fires faster.

ROCKWOOD Turrets provide plenty of volume *and* versatility. What's more, all are easily adjustable on the fire line to meet changing fire conditions. Produced by the world's largest manufacturer of specialty Fire-Fighting Turrets, they're designed to give fire fighters an extra edge of efficiency on most types of fires. Get full details on the complete line of fire-fighting products. Write ROCKWOOD SPRINKLER COMPANY, Portable Fire Protection Division, 469 Harlow Street, Worcester 5, Massachusetts.

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Engineers Water ... to Cut Fire Losses
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deflector. The releasing device in most sprinklers is a soldered link element.

Various types of heads are available for use under a wide range of temperature conditions. Heads of too high a rating are slow to operate. A fire would gain considerable headway and open more heads than needed. Soldered links with too low a rating may become weakened and operate prematurely.

For normal room temperatures up to 100 F., ordinary sprinklers are used. When temperatures are higher, thermometer readings should be taken near the ceiling and ratings selected accordingly.

In the few cases where sprinklers have failed to function when needed, the fault has rarely been due to the sprinkler mechanism. Deficient water supply, freezing, defective dry-pipe valves, foreign material in the system, corrosion, obstruction of sprinkler heads by stock piles, or paint on sprinkler heads are among the causes.

Wet-pipe systems are used for most installations. Water to sprinkler heads is maintained under pressure and operation is immediate. This type requires protection against freezing.

Dry-pipe systems are used where there is danger of pipes freezing. Instead of water, air under pressure is maintained in the pipes. Opening of a sprinkler head releases air pressure, resulting in operation of a valve admitting water to the system. There is a slight delay between opening of sprinkler head and discharge of water.

After a fire, sprinkler heads should be replaced promptly.

Sprinkler Supervision

Flow of water in the system can be used to sound an alarm for fire and accidental leakage. The alarm check valve installed in a sprinkler riser can ring a hydraulic gong or an electric bell, or both.

A less expensive type, the waterflow indicator, is a paddle-like vane projecting into the piping. An electric bell sounds when the vane is deflected by flow of water.

Water-flow alarms are desirable where building contents are susceptible to water damage. They are useful supplements to watchman service.

Where central station supervisory service is available, waterflow alarms are transmitted to headquarters, which calls the fire department and sends a man to the plant to investigate.

Special Systems

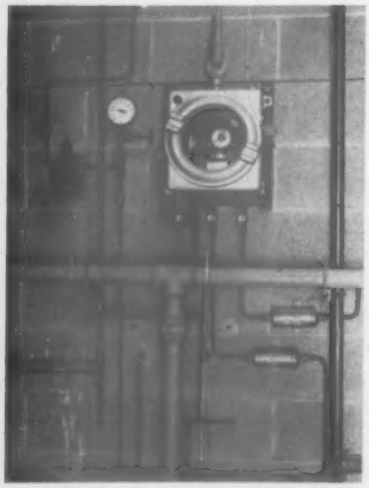
For special risks, automatic systems employing carbon dioxide, foam, or water spray nozzles may be installed.

Carbon dioxide is desirable where the system operates in an enclosed space and value of contents is high and subject to water damage. Carbon dioxide can be discharged either manually or automatically by heat-actuated devices.

Devices also close shutters, doors, windows, and dampers and stop blowers to confine the extinguishing gas. These systems are suitable for spaces containing electric equipment or flammable liquids.

Foam installations are suitable for tanks and operations involving flammable liquids, but not for electric fires. They usually operate automatically, with provision for manual operation.

Water spray systems are used to protect oil-filled electric equipment, such as transformers, oil switches, and oil piping and open tanks of flammable liquids. Water spray systems require expert installation.



Combustible gas alarm samples and analyzes for conditioning systems of control rooms. When gas in sample reaches predetermined concentration, audible and visible alarms are given. (MSA)

Other systems for limited and specialized occupancies use vaporizing liquid, steam, and inert gases. For processes like paint dipping and tank operations using flammable liquids, a manually or automatically operated cover is an effective means of extinguishment.

Obstructed piping. A plant's fire protection may be crippled in an emergency when scale, stones, or other foreign material become lodged in the sprinkler system. Should a fire occur, discharge from the sprinkler heads would be insufficient to check the blaze.

Regular examinations can determine whether the system contains an excessive amount of foreign material. Methods include observations of flow from the test connection on top of the system, drain tests at sprinkler risers, or hydrant flow tests.

Uncoupling piping at strategic points and examining the interior, or test flushing representative feed or branch lines, will reveal obstructions. Examination may show individual sprinklers to be clear, but that does not necessarily mean the branch lines are. * * *

Placing Extinguishers

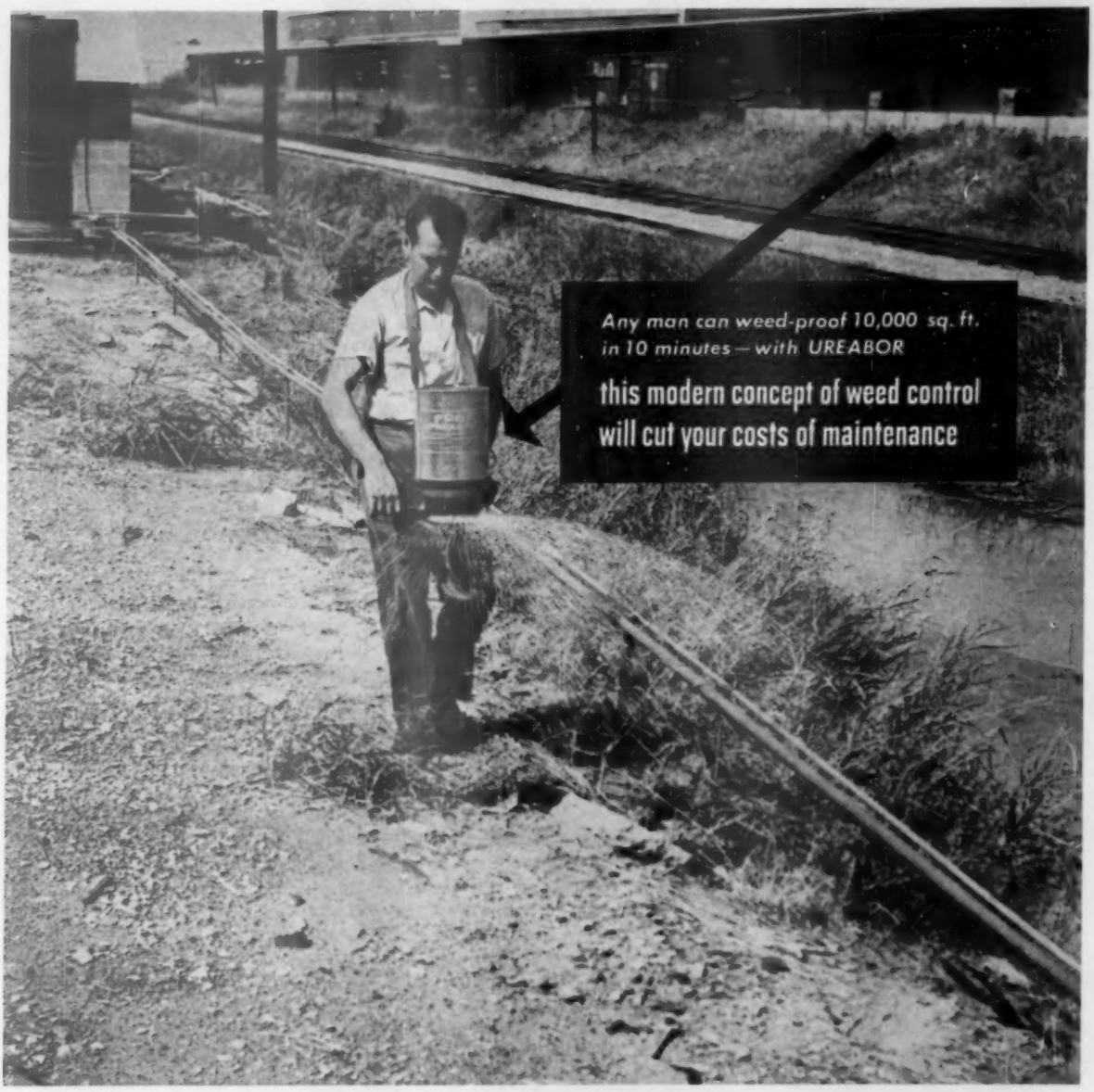
An extinguisher may be useless if an employee must spend valuable minutes looking for it, or if it is blocked by piles of materials.

Here are 6 recommended rules:

1. Locate extinguishers close to fire hazards but not in the fire zone should fire occur.
2. Place extinguishers so access will not be blocked by fire.
3. Install enough extinguishers to deal with any expected blaze.
4. Mark locations conspicuously.
5. Identify each unit for the type of fire it is designed to combat.
6. Protect from traffic.

Marking locations. Contrasting backgrounds make extinguishers conspicuous and less likely to be overlooked in the excitement of a fire. Here are 4 methods:

1. Paint a large red or white background on the wall.
2. Paint a large red spot on the floor under the extinguisher.
3. Paint vertical red bands with yellow borders down a wall or column where equipment is placed.
4. Provide lights of distinctive color which do not conflict with exit lamps. * * *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630 SHATTO PLACE • LOS ANGELES 5, CALIFORNIA

The Plant Protection Force

The men who protect life and property

GUARDS and watchmen form the core of a plant security organization. A complete program also needs a well-trained group of employees ready to guard the plant against fire and other emergencies. The smaller the plant, the more it must depend on a part-time protection force.

Organization and training pay off when the need arises. Men who have been drilled until the right procedure becomes automatic can be expected to perform their duties effectively under stress.

World War II focused attention on the need for cooperative effort to meet emergencies. In many areas industries have pooled their protection resources with municipal services. Their plant protection and medical services—trained in fighting fire, flood and storms and in rescue work and first aid—are ready to serve their communities when needed. These groups have rendered notable service in many disasters.

Preparedness requires intensive training, frequent and thorough inspections, careful maintenance of equipment, and competent supervision.

Organization. In many plants fire protection is a responsibility of the safety department. In larger plants, where there is more specialization, the safety department usually has an important part in the program.

Functions of an employee fire safety organization are:

1. To detect and correct hazards—to fight fire before it starts.
2. To maintain fire equipment for efficient action.
3. To become efficient in fire-fighting techniques.

To afford real protection, a fire-protection program must function 24 hours a day.

The fire-fighting organization may consist of a few trained employees with hand extinguishers or it may be a company fire department with full-time personnel. Regardless of its size, the municipal fire department should have a prominent place in plant protection plans.

City firemen should be familiar with the plant layout, its fire-fighting resources, and its hazards. They can also help in training and equipping the company's fire fighters.

A plant should not depend on the city fire department alone. Even under favorable conditions, it takes time for outside apparatus to reach the fire, and in an emergency, the department might be busy elsewhere.

Fire squads may consist of five or six men in each department. They act as inspectors, reporting and, where possible, correcting fire hazards. They should be taught the use of first-aid extinguishers by actual demonstrations on small fires. They should also be impressed with the importance of turning in alarms promptly.

Trained men on the job will put out many fires before serious damage results and also help prevent panic.

Fire brigades. For larger plants, hydrants and hose systems are basic protection. Trained men are needed to use them. Members of department squads can be members of the plant fire brigade.

These men should be familiar with the plant, its protective systems and water supplies. They should be drilled frequently by handling hose streams—no job for an amateur.

Each man should have a definite task. Some should be assigned to protecting goods and machines from water damage.

Fire departments. Some plants have full-time motorized fire departments. The department supervises the plant protection program and is trained in specialized fire-fighting methods.

Watch service. Watchmen are indispensable in protecting industrial property. They discover and correct fire hazards, detect outbreak of fire, extinguish incipient fires, and summon help when needed.

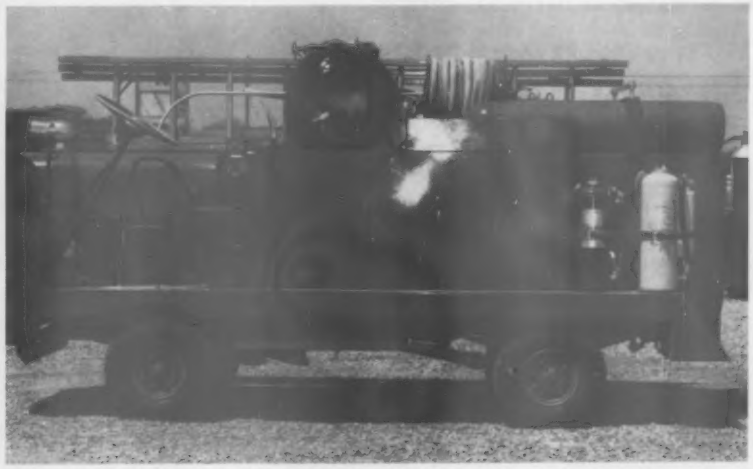
The watchman should be a mature, able-bodied man who is loyal and dependable. When the regular working force is absent, the safety of the plant may depend on him.

The watchman should be familiar with all parts of the fire protection systems, drains, and fire pumps. He should know how to operate extinguishers.

Recorded hourly rounds are recommended. Approved watchclock or supervisory systems record calls at each station.

Many fires occur just after a plant has closed down. The watchman should make his first round

—*To page 244*



Mobile fire-fighting units are needed where plant buildings cover a large area. They carry portable extinguishers, hose, ladders, and other accessories. (Ansul Chemical Co.)

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DRY CHEMICAL
FIRE EXTINGUISHERS

THESE LETTERS AND

NUMERALS certify that this cylinder is spun from seamless steel, manufactured and tested under rigid ICC specifications.

Each SAFE-T-METER extinguisher body is of this one-piece construction, capable of holding pressures far *in excess of normal use*. This valve assembly, also, is equipped with a gauge guard and an approved safety pressure relief device as added safeguards.

SAFETY FIRST believes in its obligation to provide that "extra" margin of protection to the user, assurance that he has a superior product of maximum strength and safety.

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SAFETY FIRST PRODUCTS CORPORATION

ELMSFORD, NEW YORK

Manufacturers of Safe-T-meter *Pressurized Fire Equipment*

Inspector makes check for flammable gases and vapors. (Diamond Alkali Co.)

Flammable Liquids

FLAMMABLE LIQUIDS, as defined by the National Fire Protection Association, are those which give off flammable vapors at or below 200 F. They are divided into three classes:

Class I. Below 20 F. Ethyl ether, acetone, carbon disulfide, gasoline, benzol, collodion.

Class II. 20 to 70 F. Amyl acetate, ethyl alcohol, toluol, ethyl acetate, varnish.

Class III. Above 70 F. Stoddard solvents, kerosene, amyl alcohol, creosote oil, turpentine, fuel oil.

The flash point of a liquid is the lowest temperature at which it gives off enough vapor to form explosive mixtures with air which are capable of propagating flame when ignited.

Portable containers. Safety cans, painted red, with self-closing spouts and flame-arresting screens should be used for Class I and Class II liquids.

If several varieties of liquid are handled in a department, stripes or distinctive lettering should be placed on the can to prevent accidental mixing.

The following labels are recommended:

1. Flash point below 20 F.—DANGER! — EXTREMELY FLAMMABLE — Keep away from heat, sparks, and open flame. Keep closed when not in use.

2. Flash point 20 to 80 F.—WARNING! FLAMMABLE—Keep away from heat, sparks and open flame. Keep closed when not in use.

3. Flash point 80 to 150 F.—CAUTION! COMBUSTIBLE — Keep away from heat and open flame. Keep closed when not in use.

Static electricity. Points of danger are at the outlet of a flammable liquid fill pipe, at a delivery hose nozzle, near an open container, and around a tank truck fill opening or barrel bunghole.

To prevent static sparks during filling, a wire bond should connect storage container and container being filled. The bonding wire or receiving container should be grounded.

Tank cars, storage tanks, tank trucks, connecting pipes, and hose lines and filling nozzles should be interconnected with bonding wire before attempting to open connections during loading or unloading.

When pouring from one container to another, the lip of one container should rest on the edge or lip of the other. The receiving vessel should rest on a grounded surface, The two should be kept in contact during pouring.

Storage tanks above ground, not in contact with moist earth or connected to grounded pipe lines, should be grounded. Grounding wire should be uninsulated.

Electrical equipment. For Class I hazardous locations, explosion-proof electrical equipment is specified by the National Electrical Code.

Approved safety can with dispensing hose for flammable liquids. Cutaway shows flame arrester. (Protectoseal Co.)

Wiring should be in rigid conduit, with fittings approved for explosive atmospheres.

Transfer pumps of approved design should be used where quantities of flammable liquids are handled. These pumps are self-priming and equipped with flame arresters and protected openings for pressure and vacuum relief.

Combustible gas indicators are available for testing for various gases and vapors including carbon monoxide, hydrogen sulfide, benzol and for oxygen deficiency. An indicator should be used only by an experienced person and the manufacturer's instructions should be followed. * * *

Wetting Agents

Added to water, wetting agents increase its penetrating power on burning materials. This "wet" water has proved effective in extinguishing fire in loosely packed materials such as cotton bales, peat, hay, and decaying leaves in forests. The needed penetrating action cannot be obtained by the velocity of a stream of ordinary water.

Wetting agents break down the surface tension that holds the film of water together. The solution has unusual spreading and penetrating qualities and it also is absorbed more quickly by solid materials and adheres to them more readily.

Wetting agents may be applied effectively and used with all types of standard fire apparatus where plain water is normally used.

Approved wetting agents are no more corrosive than plain water to steel, bronze, and copper. For continuous storage, such materials as cast iron, zinc, galvanized iron, die-cast alloys, and painted surfaces should be avoided. Wetting agents, although not corrosive, may accelerate corrosion due to the cleaning and penetrating action which penetrates and loosens unbonded coatings which are not baked on.

Detailed information will be found in National Fire Protection Association's Standard No. 18, *Wetting Agents*.

Wetting agents which meet requirements of the standard are listed in Underwriters Laboratories *Fire Protection List*. * * *

do your FOAM CHAMBERS measure up to these standards?

1. Are they vertical rather than horizontal, so that they won't snap off if the tank explodes? ☐ Yes ☐ No
2. Are they truly compact in design . . . reducing labor costs during installation? ☐ Yes ☐ No
3. Do they permit filling tanks to the top angle without immersing the glass diaphragm and running the consequent risk of loss of product in case of broken glass? ☐ Yes ☐ No
4. Do the deflectors spread foam in a fan-shape pattern to reduce submergence and turbulence? ☐ Yes ☐ No
5. Do they use positive pressure to break the glass diaphragm, instead of merely relying on water velocity? ☐ Yes ☐ No
6. Do they require minimum maintenance? ☐ Yes ☐ No

If you can answer YES in all cases, you already have National Aer-O-Foam Chambers. If not, you need them! For full information, write for Booklet E.

NATIONAL FOAM SYSTEM, INC.

West Chester, Pa.

Fan-shaped pattern of foam discharges from deflector inside tank

Type MCS Foam Chamber, with Selective Orifice Foam Maker

Static Electricity

SPARKS resulting from static accumulations are a common source of fire. The hazard is particularly serious wherever there may be flammable vapors, gases or dusts.

Cold, dry weather is most hazardous. A warm, humid atmosphere helps to draw off static charges.

Causes. Static charges result from:

1. Friction between small particles.
2. Contact and separation of two unlike substances, one or both of which are nonconductive.

Gasoline and other flammable liquids flowing through hose, or dust-laden air through nonconductive passages, may produce static charges.

Belts and shafting. Static charges are generated on dry belts (particularly rubber or leather) by contact and separation of belt and pulley. Accumulations can be controlled by use of conductive rubber belting.

Belts can be grounded with sharp-pointed metal combs or metallic tinsel static collectors which are grounded.

Where highly flammable vapors may be present, chain drive or conductive rubber pulleys, rather than combs, should be used.

Conductive rubber belt dressings, if renewed frequently, are helpful.

Powdered materials. Finely divided materials falling through the air or blown through pipes may generate static electricity and ignite explosive mixtures of dust and air. Machines should be bonded and grounded at several points.

Preventive Measures

Humidity maintained at or above 60 per cent at 70 F. helps to prevent accumulation of static charges. High humidity is obtained by special humidifiers of steam jets installed on blower-type heaters.

Ionization of air also is used. Ionized air contains electrically charged particles which conduct static charges to grounded parts of machines. Ionization methods include gas flames, discharges of high potential electric current, and radiation from radioactive material. These methods require expert installation and maintenance to avoid possible fire or health hazards.

Conductive shoes. Body static charges may create a hazard in areas which contain highly flammable dusts, gases and vapors. Shoes with conductive soles and heels help drain off charges. Their conductive value is reduced by foot powders and by wool, silk, or nylon socks. Cotton and rayon are safer.

Conductive floors should be installed in hazardous locations. Ordinary wax and other nonconductive floor finishes reduce the value of grounding measures. Special finishes for conductive floors should be used.

Automatic sprinklers should be provided inside bins and processing equipment containing combustible materials. Where water may cause reaction with or damage to material, inert gas extinguishers may be used. * * *

Construction that Resists Fire

THERE IS no such thing as a "fireproof" building but some types of construction can survive a fire with only minor structural damage.

Building materials should be noncombustible wherever practicable, although any material may be damaged by extreme heat.

Walls and openings should be planned to prevent rapid spread of fire. Large areas should be subdivided by fire walls, with openings protected by fire doors.

For occupancies of light hazard, heavy plank roofs and floors are permissable. Heavy timbers are slow burning.

Wooden walls, joisted quick-burning floors and roofs, and inaccessible combustible spaces should be avoided.

Limiting Fire Areas

Hazardous processes should be cut off by fire walls or fire-resistant partitions. Severe hazards should be housed in separate buildings.

Explosion hazards require explosion-venting windows or other means of relieving pressures to minimize structural damage.

Important buildings with combustible roofs and floors should be separated by as much yard space as possible.

For buildings of more than one story, stairways, elevator wells, conveyors, and chutes should be enclosed with fire-resistive walls. Fire doors at openings check spread of fire to other floors.

Blank walls, fire shutters, and wired-glass windows offer protection against exposure fires. Open outside sprinklers, usually operated manually, are an additional safeguard.

Fire doors should either close automatically each time they are opened or closed by a heat-actuated device if fire should break out. The most common device is a fusible link.

The releasing device should be located where it will be affected quickly by heat passing through the doorway and should be protected against mechanical injury.

Where flash fires may occur, quick-operating devices are preferable, except for doors used as exits.

Types of doors for various exposures have been approved by testing laboratories.

Fire shutters are used for windows where there is an exposure hazard from adjacent buildings. Shutters may be swing type (tin clad or steel) or rolling steel. The latter can be installed where space is too limited for swinging shutters.

Sliding shutters are not recommended where snow and ice might interfere with their operation.

Portable Extinguishers

—*From page 224*

How to Select a Fire Extinguisher. Portable fire extinguishers are classified in the NFPA standard in accordance with the following paragraphs. This method of classification differs in important details from that in use up to three years ago. An understanding of these paragraphs is essential to selection of the proper extinguisher type. The appended chart will also be of assistance in extinguisher selection.

Classification of Fire Extinguishers

231. Based upon the preceding classification of fires and also upon fire

NEW . . .
REVOLUTIONARY

ABC®
ALL CLASS

Patented

THE ONLY FIRE EXTINGUISHERS APPROVED
BY UNDERWRITERS' LABORATORIES
FOR ALL CLASSES OF FIRES:
CLASS A, B, C AND MAGNESIUM

Write to ALIM CORPORATION
11 Park Place, New York 7, N.Y.
for full information
Specify Brochure S10

Manufactured for ALIM CORPORATION
Manufacturers of Sbf *Fire Retardant Paints*
by STOP-FIRE Inc., New Brunswick, N. J.

extinguishment potentials as determined by physical testing of fire extinguishers by Underwriters' Laboratories, Inc., classifications have been established for portable fire extinguishers.

232. This classification consists of a *numeral* and a *letter*. It appears on the label affixed to the extinguishers labeled by Underwriters' Laboratories, Inc., and Underwriters' Laboratories of Canada. This *numeral* and *letter* connote the following:

(a) In the case of Class "A" extinguishers, the *numeral* is indicative of the approximate relative fire extinguishing potential of various size Class "A" fire extinguishers, i.e., a 4-A extinguisher can be expected to extinguish approximately twice as much fire as a 2-A extinguisher.

(b) In the case of Class "B" extinguishers, the *numeral* is also indicative of the approximate relative fire extinguishing potential of various size Class "B" fire extinguishers, and in addition, the *numeral* is an approximate indication of the square-foot area of deep-layer flammable liquid fire which an average operator can extinguish, i.e., a 10-B unit can be expected to extinguish 10 square feet of deep layer flammable liquid fire when used by an average operator.

(c) In the case of Class "C" extinguishers, no *numeral* is used since Class "C" fires are essentially either Class "A" or "B" fires involving energized electrical wiring and equipment. The size of the Class "C" extinguishers installed should be commensurate with the size and extent of the area involving the electrical hazard or containing equipment being protected, considering that it must be covered or blanketed by the Class "C" extinguishing media for effective fire extinguishment.

(d) The *letter* refers to the class of fire (see Paragraph 221 preceding) on which the use of the particular extinguisher is approved for most effective fire extinguishment.

Look for the Label

Approved extinguishers carry the label of Underwriters' Laboratories or Factory Mutual Laboratories. They also carry this information:

1. Type of extinguisher.
2. Type of fire for which it is recommended (Class A, B, C).
3. Instructions for use.
4. Unit rating.
5. Instructions for inspection and recharging.

An approved extinguisher must have adequate capacity. The vaporizing liquid type, for example, must contain not less than 1 qt. of extinguishing agent.

Cold-Weather Precautions

Extinguishers. In unheated locations, provide nonfreezing extinguishers, or heated cabinets for extinguishers which could freeze. Fill fire pails with nonfreezing solutions.

Fire pumps. Keep pump houses adequately heated.

Protect suction pipe and intake from freezing.

Hydrants. See that hydrants are tight and drain properly.

Keep hydrants and indicator posts unobstructed by snow.

Wet-sprinkler system. Provide adequate heat in all sections, especially over week ends.

Repair windows and doors which are not weather-tight.

Dry-sprinkler systems. Make sure dry-pipe value enclosures are well heated.

Check air pressures daily.

Check dry-pipe alarms.

Blow out drains and low points frequently.

Check pitch of all piping for pockets where moisture could collect and freeze.

Sprinkler tanks. Provide heating systems for tanks and be sure they are in good operating condition. Flush out circulating pipes and heater.

Do not overflow tanks to prevent freezing.

7 WAYS to Judge a Flammable Liquid Safety Can...

1. LEAKPROOF CONSTRUCTION
Seams are lap-joined and electrically welded into durable "one-piece" container capable of standing up to rough service.

2. "SHOCK-RIM" BOTTOM
Can bottom is raised 5/8" up into can body to provide protective rim around base of can.

3. DOUBLE WALL FLAME ARRESTERS
Provide a durable double barrier. If inner wall is damaged, outer wall provides protection until unit is replaced.

4. MECHANICALLY JOINED FILL SPOUT
Spout is "clinched" and soldered to top section of the can to withstand strain of repeated opening and closing.

5. LEAKPROOF SPOUT SEAL
Spring operated cap has ball and socket joint assembly to assure uniform, self-adjusting, liquid-tight seal of special leak-resistant gasket.

6. QUICK-ACTING DISPENSING VALVE
Convenient hand operation gives fast, positive control while pouring. Instantly shuts when pressure is released.

7. SHOCK GUARD CARRYING HANDLE
Handle design shields dispensing lever against accidental opening from shocks or bumps.

Protectoseal Safety Dispensing Cans incorporate these, and many more design and operating features to provide optimum safety and service. Because Protectoseal Safety Cans are built better to serve longer, they are your best buy.

When you are considering the purchase or specification of Flammable Liquid Safety Cans, investigate the "hidden values" you get in Protectoseal Products. Compare them, point by point, with any other can and you will see why they are the quality standard of the industry.

Protectoseal Safety and Storage Cans are made in a wide range of sizes and types. They are stocked in strategically located Protectoseal Warehouses and Service Centers for quick delivery.

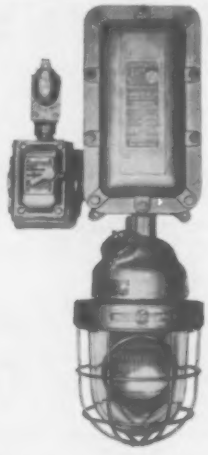
Write for the new Catalog of Protectoseal Equipment for the safe storage, handling, and use of flammables.

THE PROTECTOSEAL COMPANY
1929 SOUTH WESTERN AVENUE · CHICAGO 8, ILLINOIS

Circle Item No. 178—Reader Service Card Circle Item No. 179—Reader Service Card

Inadequate? Of Course . . .

BUT... HOW MUCH BETTER ARE YOUR EMERGENCY LIGHTS?



Just two of the many Watchmaster models available for your specific needs.

Life and limb are at stake when you specify automatic emergency lights. Be certain you get the added *safety margins* built into every Carpenter *Watchmaster*.

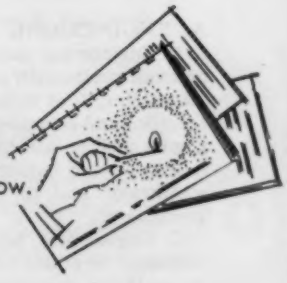
Watchmasters are expressly designed to perform under far more exacting conditions than would normally be encountered in use. Every unit . . . every component . . . is engineered to do its job . . . and then some.

These extra safety margins, at the same time, assure longer life and less maintenance . . . adding up to lowest cost over the years.

There is a Carpenter Watchmaster model for every need (including hazardous exposures) and every budget.

TECHNICAL SPECIFICATIONS

and full details are available for the asking. Write for your Watchmaster information file now.



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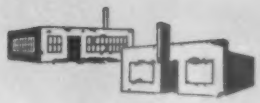


SMALL BUSINESS and ASSOCIATIONS

By RAYMOND C. ELLIS, JR., and JOHN T. CURRY

Small Business Program Staff, National Safety Council

Association Cooperates In Hearing Conservation

The effectiveness of cooperative safety efforts through the company, the association and NSC is evidenced in a recent report to the members of the American Paper and Pulp Association. The report outlined procedures to be followed in member plants for the protection of employees' hearing against occupational noise.

Following are the essential elements of the program:

A. Engineering control to determine which areas and operations produce hazardous noise and to reduce or shield such noise from employees.

B. Medical procedures to determine the hearing ability of all persons hired, of all persons working in or transferring into areas of hazardous noise, and to fit such persons with proper ear-protective devices.

C. Educational means to inform plant management, supervisors, foremen and employees working in areas or on operations producing hazardous noise of its effects and of the company's program to protect hearing.

D. Supervisory methods to instruct employees in use of personal protection and to obtain compliance with instructions.

A. ENGINEERING

1. Engineering noise studies shall be made periodically of all plant operations. Results of these studies shall be recorded and charted on a chart sheet. Copies shall be sent to the plant safety coordinator or industrial relations administrator and to the chief safety coordinator.

2. Engineering methods shall be employed to obtain reduction of noise in areas or operations found to be hazardous in the noise studies. Such methods shall include:

a. Substitution of methods.
b. Resilient mountings.
c. Isolation from noise sources.
d. Sound-absorptive materials.
e. Control of air and gas jets and exhaust silencing.
f. Preventive maintenance.
g. Design of future machines and buildings.

B. MEDICAL

1. Audiometric measurement of hearing ability shall be a part of the pre-employment physical examination of each employee hired. The audiogram (record card) shall be filed with his physical examination record in his medical file.

2. Hearing tests shall be given and audiograms retained for all employees and foremen who work on operations or in areas producing hazardous noise.

3. Ear protection shall be fitted and issued to all employees and foremen working in hazardous noise areas.

4. Follow-up audiograms shall be made each six months of all employees and foremen working in hazardous noise areas.*

5. A stock of ear plugs shall be maintained in the first-aid department.

C. EDUCATIONAL

1. Meetings shall be held to inform managers, superintendents, supervisors and foremen in charge of hazardous noise areas or operations and the plant engineer of what determines hazardous noise, its effect upon people and the program to control noise and minimize its effects.

2. Employees in hazardous areas shall be informed of:

a. The effects of noise on people.
b. What noise reductions can be accomplished by engineering; and what cannot.
c. What protective procedures must be followed by all employees in hazardous noise areas.
d. The effectiveness of personal ear protection.

D. SUPERVISORY

1. Rules shall be set up covering requirements for protection of foremen and employees working in hazardous noise areas.

2. Foremen and employees in these areas shall be informed of these rules and a date set for full compliance.

3. Supervisory insistence upon compliance shall be required. Employees should be checked each shift.

4. Provision shall be made for disciplinary action in case of violation of rules.

5. As employees are added or transferred to hazardous noise areas, the above procedures shall be carried out.

*Note: Should follow-up audiograms disclose further loss of hearing in an individual, the plant physician should be consulted to determine, if possible:

a. Whether the loss is due to plant noise or to other causes.
b. If the employee can safely continue to work in the environment he was in during the period of increasing loss, or if he should be removed from that exposure.

Consultation with an otologist may be necessary to determine answers to these questions.

Financial Editor Reports—

William Clark, financial editor of the *Chicago Tribune,* recently completed a series of 38 stories about middle-sized midwestern manufacturing companies. Most of these firms ranged between 15 and 35 million dollars in annual sales volume. A few indicated sales of less than 10 million dollars. And one company had a 100-million-dollar-plus sales volume.

The title of the series, "Stories Reveal Traits of Business Success," may be rephrased to include safety. Providing the framework for an effective safety program, these character traits for business success underscore the fact that "safety is good business":

"1. Good housekeeping. It seemed to us that evidence of good housekeeping was a reliable indicator of good all-around management and good management-employee relations.

"2. Delegation of authority as well as responsibility to subordinates by chief executives.

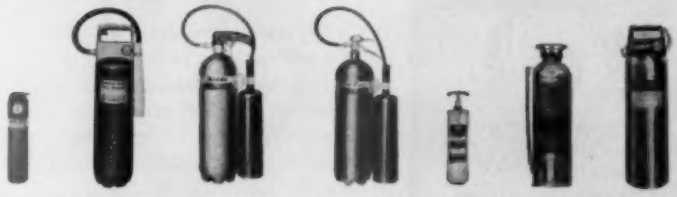
—*To page 242*

WHATEVER THE FIRE—KILL IT FAST WITH TOP-RATED KIDDE PORTABLES!

CLASS "A" PAPER, WOOD, TEXTILE

Left to right: New pressurized water; cartridge-operated water or anti-freeze; foam; soda-acid; pump tank — water or anti-freeze; pressurized loaded stream. All 2½ gallon; pump tank also 5 gallon.

CLASS "B" GASOLINE, FLAMMABLE LIQUID



Left to right: 2½ pound pressurized dry chemical; 30 pound pressurized dry chemical; trigger carbon dioxide; squeeze-valve carbon dioxide; vaporizing liquid; foam; pressurized loaded stream. Wide variety of capacities.

CLASS "C" ELECTRICAL MACHINERY, EQUIPMENT

Left to right: 5 pound pressurized dry chemical; 20 pound pressurized dry chemical; squeeze-valve carbon dioxide; trigger carbon dioxide, vaporizing liquid. Wide variety of capacities.

KIDDE FIRE DETECTION AND EXTINGUISHING SYSTEMS

For bigger, more dangerous hazards, get the full protection of a Kidde system. Kidde makes a full line, including fully-automatic carbon dioxide extinguishing systems, plus smoke detectors and rate-of-temperature-rise and fixed-thermostat fire detectors. All Kidde systems are efficient, dependable, and approved by Underwriters' Labs. For more information, write Kidde today.

Kidde (K Kidde)

Industrial and Marine Division

Walter Kidde & Company, Inc., 345 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd., Montreal—Toronto—Vancouver

NEW

AMERICAN LAFRANCE

2½ lb. Dry Chemical

Fire Extinguisher

The small extinguisher with the BIG wallop! Now, from American LaFrance comes this new, larger-capacity portable extinguisher. Especially suited for small hazards, lift trucks, portable machinery, etc. Economically priced . . . ideal for replacing your vaporizing liquid units. And it's way ahead in features:

- **2½ lb. capacity, 4B:C rating**
- **Approved by Factory Mutual, Underwriters Laboratories, Coast Guard**
- **Lifetime shell, easily recharged**
- **One-hand, squeeze handle operation**
- **Tell-tale gauge, *positive* visual inspection**

The PDC-2½B is the latest addition to the complete line of American LaFrance dry chemical extinguishers. There are 6 sizes to fill your needs, from 2 lb. to 30 lb. Your American LaFrance Representative has the details. Ask him . . . or write us.

AMERICAN LAFRANCE

ELMIRA N.Y. U.S.A.

In Canada: LaFrance Fire Engine and Foamite Ltd., Toronto, Ont.

Small Business

—From page 240

"3. Refusal to be bound by the established way of doing things, or established product designs, simply because they are established.

"4. Awareness by top management that a good disposition is a business asset.

"5. The expressed expectation by management that all employees—salaried or hourly-rated—will do a day's work.

"6. Respect for and pride in profit—without apology."

Bear Traps and Beavers

The Lumbermen's Safety Association (Ontario and Quebec), the Quebec Pulp and Paper Makers Safety Association, and the Ontario Pulp and Paper Makers Safety Association have sponsored a "Beaver Club," which encourages woodsmen to use personal protective equipment.

The Beaver Club is open to employees of association members who have avoided a serious injury or fatality by use of a hard hat, face protection, or buoyant vest.

The Lumbermen's Safety Association (Ontario) has issued another colorful folder, warning member employees about "bear trap" hazards, and of heavy chains circling truckloads of logs. The folder encourages employees to use special safety releases rather than makeshift devices.

Metal Fires Need Special Extinguishers

Ordinary extinguishers are not effective for magnesium, powdered aluminum, zinc, sodium, or potassium fires. Only special proprietary compounds should be used on large quantities of burning magnesium or other finely divided reactive metals. This is available in 40-lb. pails and 325-lb. drums. It is usually applied in a layer at least 1½ in. deep.

Where large amounts are needed, a wheeled applicator holding 600 lbs. of powder can be used. The powder is discharged by an electric impeller through a hose and nozzle. Small dry chemical extinguishers are not recommended for industrial exposures.

DOW | **WEED AND GRASS KILLERS**

WEEDS ARE A HAZARD YOU CAN'T AFFORD!

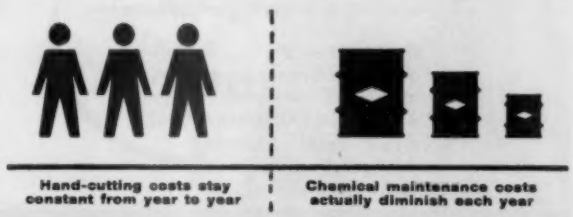
Spray them away chemically with low-cost GARLON

Weeds and grass along this dock are a three-way hazard. They provide tinder for a carelessly discarded match that could turn nearby flammables into a raging inferno. They interfere with the safe operation of the switch. And they collect rust-causing moisture around tracks and pipelines. Imagine how exposed tracks and lines would slow the work of men cutting this vegetation by hand!

The labor-saving, modern method—spray them away with Garlon*. Even weeds and grass difficult to cut by hand are easy to reach with this chemical killer. Garlon works systemically—application to the foliage knocks out the entire weed or grass plant—roots and all! Spot retreatment, if needed, is easy and inexpensive. Simply mix Garlon with the recommended amount of water, and you're ready to spray. For maximum convenience, you can apply it effectively *anytime* during the growing season. Your own men can do the job, or a professional contractor will do it for you.

Save more each year! By controlling unwanted weeds and grass around your plant with Garlon, the whole problem diminishes year by year. After initial treatment, you will find fewer applications needed in future years.

*TRADEMARK



Hand-cutting costs stay constant from year to year

Chemical maintenance costs actually diminish each year

For more information on modern chemical vegetation control, write: THE DOW CHEMICAL COMPANY, Agricultural Chemicals Sales, Dept. 208CX3, Midland, Mich.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Protection Force

—*From page 232*

immediately after operations have stopped.

Training Fire Fighters

Essentials of training, as recommended by the National Fire Protection Association, are:

1. Officers and firemen should be kept fully informed on all phases of fire prevention and extinguishment. They should be encouraged to attend drill schools of the local fire department, or a fire college. Books, pamphlets, and magazines are available. The rapid development of industry constantly brings new fire hazards and extinguishing methods.

2. Drills should be held at least twice a month during paid time. Location of drills should be changed each time, so that men will become familiar with all conditions and areas of the plant and be able to cover any emergency that may arise.

3. Drills should include making hose connections with hydrants, unreeling and stretching hose without kinks, coupling and uncoupling, attaching play pipes, carrying hose up ladders, over roofs and through the interior of the building.

As a general rule, water should be turned on for all outdoor practice work, except during freezing weather. (This assumes rubber-lined hose; unlined linen hose should not be wet.)

4. Drills should be disciplined, moderately paced, and accurate.

5. Members of the brigade should be examined regularly to make sure they know the location of fire alarm boxes and the meaning of various fire alarm signals. * * *

Vibratone
HORNS ARE BETTER because— they're
EASIER TO INSTALL
Easier installation means less costly installation.
Easier installation promotes better workmanship.
Contractors prefer VIBRATONES because they require no special tools or fittings; because they attach readily to any outlet box, and because they involve no tuning or complicated adjustment.
This is but one of dozens of advantages of the VIBRATONE over other horns.
Specify FEDERAL VIRBRATONES on your signal installation.
Investigate!
Ask for Bulletin #105.
FEDERAL SIGNAL SIGN and Corporation
13625 S. Western Ave., Blue Island, Ill.

Principles

—*From page 221*

dling heavy streams. They are a valuable auxiliary to the city fire department. Piping should be of sufficient size for buildings of more than four stories.

All outside hydrant nipples and hose couplings should have American Standard 2½-in. fire hose thread.

The 2½-in. single jacketed rubber-lined hose is ordinarily used outside. It is flexible and lightweight. Double-jacket hose is used principally for rougher service in municipal fire departments.

Rubber-covered hose is sometimes needed where there is exposure to fumes or corrosive liquids. Neoprene has been found superior to natural rubber for most uses. Dacron is durable and mildew resistant and is being used in an increasing number of installations.

The 1½-in. hose is useful for small fires and for wetting down fires after the blaze is under control. It can be handled by one or two men.

Playpipes and nozzles. Standard underwriters' playpipes throw an effective stream but are difficult to handle, particularly on ladders. The short, rigid playpipes with strap and ladder hook, with shut-off nozzles to reduce water damage, are more suitable for plant use.

Adjustable spray and straight stream nozzles (for both 2½- and 1½-in. hose) give water-curtain protection for fireman and a blanketing effect. They also provide solid streams for penetration.

HERE'S HOW TO SAVE MORE MONEY!

Use THE COMPLETE LINE of Eagle cans and oilers for safe, sure maintenance in your plant!
GALVANIZED GASOLINE CAN
WELDED STEEL

One Eagle can recommends another. For your machine shop, tool kits, maintenance operations, there is an Eagle oiler, safety can, oil or gasoline can to fill the need. An Eagle is so indispensable! Eagle Safety Cans are Underwriters Laboratories and Factory Mutual approved. And Eagle pump oilers are guaranteed 5 years.

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Order the Complete line NOW from your supplier.

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Eagle products are stocked by leading suppliers in the U.S. and Canada.

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Serving the Trade Since 1894

MANUFACTURING CO., Wellsburg, West Virginia

Water spray (fog) nozzles are effective for oil fires. Water fog, owing to its low conductivity, can be used safely on electrical fires. Its effective range is only a few feet but this can be offset to some extent by using applicator pipes of varying lengths.

Water in solid streams should not be used for fires in electrical equipment, flammable liquids, and materials where use of water would be hazardous and water damage excessive.

Foam-generating equipment is used where large quantities of flammable liquids are stored. For some exposures permanent generating equipment should be installed.

Foam systems may be either automatic or manually operated. There are two types of foam, chemical and mechanical.

Chemical foam is formed by a chemical reaction in which masses of bubbles of carbon dioxide gas and a foaming agent produce an expanded froth.

Mechanical foam consists of bubbles of air produced when air and water are agitated mechanically with a foam solution. * * *

Spontaneous Ignition

SPONTANEOUS ignition is a chemical action in which there is a slow generation of heat through oxidation of combustible material. Under certain conditions, oxidation is accelerated until the ignition temperature of the material is reached.

This condition requires sufficient air for oxidation but not enough ventilation to carry away the heat as it is generated.

Acute cases occur suddenly and explosively; in *chronic* cases heat generates slowly until ignition takes place.

Examples of substances subject to ignition are dry yellow phosphorous, which ignites on exposure to air, and quicklime, sodium, potassium, and calcium carbide, which heat when exposed to moisture.

Some materials may be stored for long periods, processed, packed and shipped with no signs of heating. The first warning may be the discovery of smoke. Uncertainty increases the hazard.

For spontaneous ignition there must be combustible material, moisture, oxygen, and a certain minimum temperature. Impurities in combustible material may effect heating.

At ordinary temperatures some combustible substances oxidize slowly and under certain conditions reach their ignition point. These include vegetable and animal oils and fats, coal, charcoal, and some finely divided metals.

Rags and waste saturated with linseed oil or paint often cause fires. They should be deposited in waste cans with covers (preferably self-closing) and removed daily.

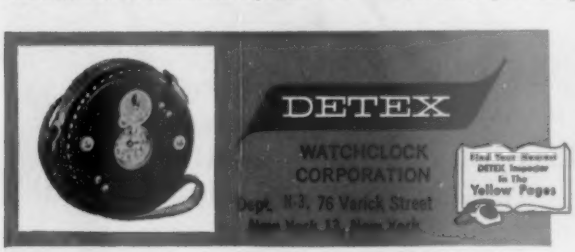
Best preventives are either total exclusion of air or good ventilation. With small quantities of material, the former is practicable. With large quantities, such as storage piles of bituminous coal, both methods have been used.

Temperatures above 140 F are considered dangerous in coal piles. If temperatures rapidly approach or

The unsupervised guard at this Pennsylvania shirt factory quit work early one Sunday morning. A little later, a passerby noticed smoke. Firemen arrived too late to save $680,000 worth of equipment, raw materials, and finished merchandise.

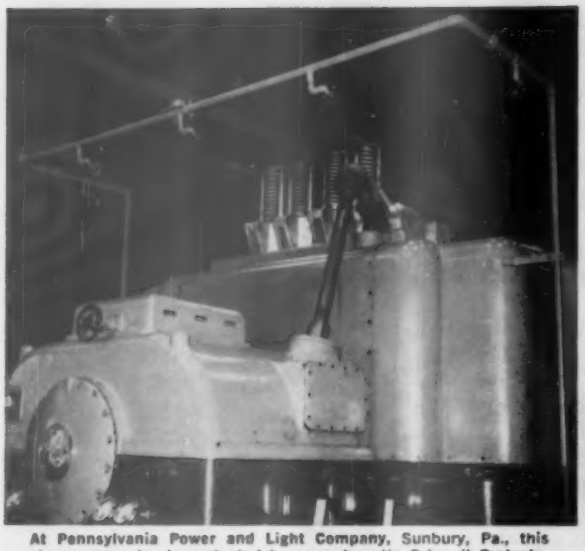
Don't let this happen to *your* plant. Supervise your guard with a DETEX Guardsman Watchclock System. It gives you a tamper-proof, minute-by-minute, embossed paper-tape record of his vigilance, keeps him *on the job* when he's *on his own.*

Guardsman supervision saves money, protects you even over long holidays and weekends. There is no need for a supervisor to return to the plant to change a 24-hour dial. Shall we send you complete information?

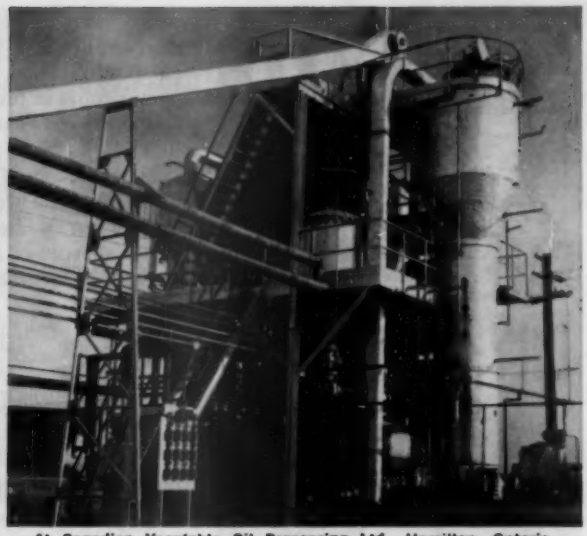


Plant Protection Manual

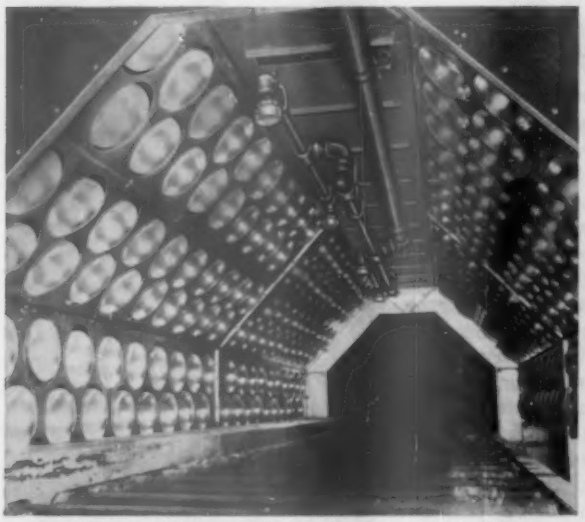
Write today for your FREE copy of this new booklet. It's a guide for management, a valuable handbook for your guards.



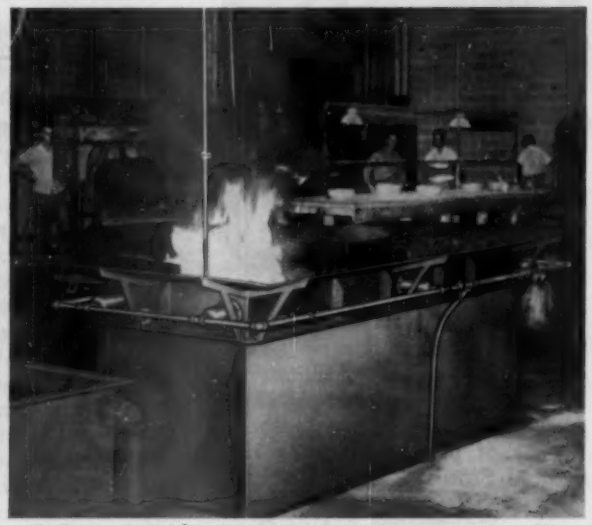
At Pennsylvania Power and Light Company, Sunbury, Pa., this steam generator is protected by an automatic Grinnell Protecto-Spray system in the event of outside fires and by a Dry Chemical system inside the casing.



At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, Grinnell ProtectoSpray safeguards upper structure of this hexane solvent extraction unit, while a ProtectoFoam system guards the lower section.



At the RCAF supply depot at Namao, Alberta, this infrared drying oven is protected by a Dry Chemical system engineered by Grinnell to protect against possible fire resulting from ignition of flammable vapor mixtures.



At Dresser Industries, Inc., Dallas, Texas, hot metal temporarily ignites resulting vapors as metal is being submerged. If fire should get out of control, a Grinnell-installed Carbon Dioxide system is on guard to extinguish it quickly.

You can rely on Grinnell for the right protection against destruction by fire!

Grinnell has had 90 years experience in devising fire protection systems for all kinds of fire hazards — systems which can be relied on to protect the continuity of your business and to safeguard your dollar investment. Grinnell offers you quality-controlled manufacturing, layouts by experienced engineers, and installations by skilled crews. Let Grinnell engineers help you select the right system.

16 mm. Sound-Color Film—Get up to date on fire with Grinnell's 35-minute film — "Fire Protection Through Research." Both typical and unusual fire hazards are described and demonstrated. To borrow this film, without charge, write — Grinnell Company, Providence 1, Rhode Island.

GRINNELL

FIRE PROTECTION SYSTEMS SINCE 1870

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SAFETY CANS *and* **OILY WASTE CANS**

"JUSTRITE" on a safety can or oily waste can is positive assurance of protection. Millions of these carefully designed and engineered cans are in use in thousands of plants all over the United States. Reduce fire hazards due to benzine, oily rags and waste. JUSTRITE Safety Cans are the finest cans for use for flammable or highly volatile liquids. Both types of JUSTRITE cans are Underwriters' Laboratories and insurance companies' approved.

FREE!

Send today for your copy of the bulletin showing the Justrite Safety Benzine Cans, Oily Waste Cans and Plunger Cans.

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MANUFACTURING COMPANY
2061 NORTH SOUTHPORT AVENUE
CHICAGO 14, ILLINOIS

world's standard of safety since 1906

exceed that figure, remove the pile or rearrange it to provide better circulation of air.

Agricultural products susceptible to spontaneous ignition include sawdust, hay, grain, jute, hemp, and sisal, especially if exposed to heat or to alternate wetting and drying. Circulation of air, removal of external sources of heat, and storage in smaller quantities are desirable precautions.

Fires in iron, nickel, aluminum, magnesium and other finely divided metals are sometimes attributed to spontaneous ignition. This is believed to result from oxidation of cutting or lubricating oils, or possibly from chemical impurities.

Detailed procedure for prevention and extinguishment of fires in material subject to spontaneous heating is found in National Board of Fire Underwriters publications, *Preventing and Extinguishing Fires in Soft Coal*, Bulletin No. 30, and *Spontaneous Ignition and its Prevention*, Bulletin No. 51.

Where to Smoke?

Smoking is a problem wherever people are employed both from the standpoint of fire hazards and time taken off the job. But the habit is widespread and must be considered from the industrial relations angle as well as safety.

Where flammable materials are handled, smoking cannot be permitted. Where no fire or explosion hazard exists, management, supervision and workers can work out details.

Prohibiting smoking is not always effective. Employees may sneak a forbidden smoke, perhaps in a hazardous spot.

A smoking area near the work place, with reasonable time for relaxation, has been the answer in many plants. Supervision is needed to prevent the relaxation from being overdone.

Receptacles for disposing of cigaret butts and pipe ashes should be placed at the entrance to any department where smoking is not allowed. In some hazardous areas employees must check matches and materials as they enter.

Chewing tobacco, while free from fire hazard, is objectionable from cleanliness and hygiene standpoints because of the inevitable accompaniment of spitting. In operations such as food processing, where scru-

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PADLOCKS

FOR PERSONNEL AND PROPERTY PROTECTION!

- Switch Boxes
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Famous Master Laminated Padlocks

Multiple steel plates . . . stronger than a solid block! Genuine brass-cylinder, pin-tumbler security. No finer padlock protection.

Stainless Steel Combination Padlocks

Double-wall construction . . . 3 number brass locking mechanism. Available with "Key-Control" — one control key opens all locks.

Special Long or Short Shackles

For switch boxes, chains, truck or freight car doors, and other uses where special shackle lengths are more desirable.

Speedy Service on Keyed-Alike and Master-Keyed Sets

Master's Service Department is geared for fast delivery . . . in emergencies, special orders are on the way within hours!

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EVERY ONE AN OUTSTANDING VALUE

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World's Largest Padlock Manufacturers

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Model G

Model H

Testing barhole for gas leakage

Two J-W portable gas detectors give reliable, trouble-free service

J-W SNIFFER, Model G, is used for a general-purpose combustible gas detector. Scale is graduated from 0-1.0 l.e.l. (lower explosive limit) for all common gases and vapors. Light in weight (4 lbs.), simple to use and maintain.

J-W GAS-POINTER, Model H is ideal for testing barholes for underground leaks in natural gas lines. Also used for testing manholes, valve boxes, etc. Two scales: 0-1.0 l.e.l. and 0-100% (pure) gas. Exclusive design eliminates electrical switching or zero shift when changing from one range to the other.

Descriptive literature on request.

J-W **Johnson-Williams, Inc.**
Palo Alto 9, California

Synonymous with safety since 1927

Canadian customers please write:
Safety Supply Co., Toronto, Ont.
Fleck Bros. Ltd., Vancouver, B.C.

© J-W 1959

pulous cleanliness must be observed, chewing tobacco is not allowed.

Cuspidors, sometimes a necessary evil, should be provided and cleaned regularly. Disposable cuspidors have obvious advantages in maintaining housekeeping. * * *

Weed Control

WEEDS are always a nuisance, often a menace. They infest plant sites, parking lots, storage yards, railroad tracks, roads, ditches, and other industrial and public areas. Control is an essential part of plant maintenance.

When dry, weeds form a serious fire hazard. Around wooden foundations, posts, lumber piles and railroad ties they hold moisture and encourage fungus rot.

Along fences and in yards where metal stocks are stored, they accelerate corrosion. Fences, pipe and fittings need more frequent replacement where uncontrolled vegetation shields them from the drying effects of sun and wind.

A rank growth of weeds will hide objects where employees walk, as along railroad sidings and switches and around parking lots. These may create tripping hazards.

Some weeds present a health hazard because of allergies associated with such species as ragweed. Poisonous plants, such as poison ivy and poison oak, are a serious menace.

Plowing and cultivating fire breaks is helpful under some circumstances but is not always practicable.

Control of weeds in lawns is relatively easy with various compounds of 2,4-D.

Crab grass can be controlled readily with many commercial products without permanent injury to desirable grasses.

Brush killer formulations are widely used for control of woody plants such as poison ivy, willows, or sumac in grassed areas.

Nonselective killers. For some locations, complete elimination of all vegetation is desirable. On such areas, nonselective soil-sterilant types of herbicidal chemicals offer an efficient and economical means of handling the problem.

Circle Item No. 190—Reader Service Card

save your voice

with the **Falcon Chief** and save money, too!

speak as you normally would—be clearly heard and understood up to ½-mile away!

Unique transistorized power megaphone—an instrument you will be proud to own. Gives up to 6,000 two-second amplified messages from standard replaceable battery. Light (3¼ lbs.)—easy to handle and use. Attractive red and gray polyethylene—built for abuse. Attractively priced for you, too!

save life & property with **New Model Falcon®**

- Simple visual inspection with new sight glass—added neatness of design.

No one can place a price on the possible loss of lives due to fire. But Falcon Automatic Fire Detectors & Systems can give early warning of fire to protect lives and guard property.

Falcon Automatic Fire Detectors & Systems are:
- Listed by U/L
- SELF-CONTAINED (no wires or batteries)
- FULLY GUARANTEED

... and they are low in cost!

To: **Falcon® ALARM CO., INC.**
Summit, N. J. Dept. NSN

Kindly furnish complete data about your "Sounds for Safety" products.

We are especially interested in your:

☐ Fire Detectors & Systems ☐ Power Megaphone
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Company _____
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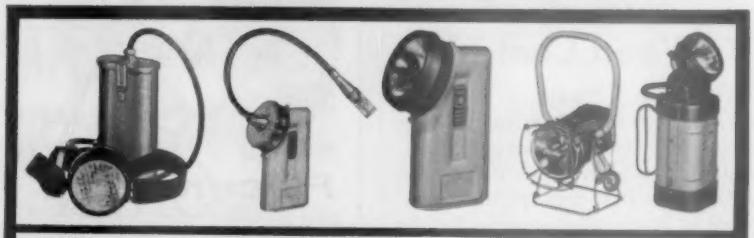
...America's greatest name in

SAFETY LIGHTS!



6 V. Safety Headlight | Safety Extension Light | Safety Flashlight | Twin-Bulb 6 V. Safety Lantern | 12 V. Safety Handlight

FREE!

A complete 16-page, illustrated, descriptive Catalog, including a comprehensive table of operating data on dry batteries and lamps.

The hazards of fire and explosion are two of the greatest dangers to plant safety. For more than 50 years, JUSTRITE has specialized in the development and manufacture of portable safety lights that meet the most rigid safety requirements and are easy to handle, resulting in employee approval. Why not standardize on the safety equipment that has been proved in thousands of situations? It's no wonder that safety engineers say "JUSTRITE is all right!"

JUSTRITE MANUFACTURING COMPANY

WORLD'S STANDARD OF SAFETY SINCE 1906

2061 NORTH SOUTHPORT AVENUE • CHICAGO 14, ILLINOIS

Sodium chlorate has been widely used and is quite effective in many cases. Because of fire hazards, its storage, handling and use require numerous precautions.

Some newer weed killers are non-selective, long-lasting when applied to soil, nontoxic to persons and animals, and non-corrosive to metals used in plant installations. They are low in cost and can be applied by company gardeners or maintenance men without special equipment. They do not introduce a fire hazard.

Fire Protection for Industrial Trucks

Industrial trucks—ram, fork or crane—can be powered by gasoline engines, liquefied petroleum gas, gasoline-electric power units, or storage batteries. These power plants require certain precautions to avoid fire hazards.

Each truck should be equipped with a 2½-lb. carbon-dioxide extinguisher; a 4-lb. gas-pressured dry-chemical extinguisher, or a 1-qt.

MEASURE CO DIRECTLY

WITH THE MONOXOR® CARBON MONOXIDE INDICATOR

THIS REMARKABLY SIMPLIFIED INSTRUMENT INDICATES CARBON MONOXIDE PERCENT IN THE AIR SAMPLE TESTED BY MEASUREMENT OF CO-STAIN IN THE INDICATING TUBE.

SAMPLER CDE

INDICATING TUBE CC-333

- ✓ Requires no color matching — is independent of operator's color perceptiveness.
- ✓ Accurate and dependable over wide range of lighting conditions.
- ✓ Not affected by presence of other gases normally encountered in safety testing (nitrous oxide, sulphur dioxide, methane, etc.)

Range: 10 to 2000 PARTS CO per MILLION PARTS of AIR (0.001% to 0.2% CARBON MONOXIDE)

M-31 For complete particulars, send for Leaflet 890A

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STREET .....

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gasoline • kerosene or any flammable liquid!

VENT-A-DRUM automatic SAFETY VALVE

protects against dangerous explosions!

The Vent-A-Drum prevents dangerous explosions which occur from fires and sudden temperature changes when storing flammable liquids, by automatically allowing air to enter or escape container. In addition to protecting property and lives, Vent-A-Drum pays for itself by reducing fuel evaporation 50%! Used by leading firms, approved by Factory Mutual Testing Laboratories. Precision-engineered, never requiring adjustment or replacement of parts. Cast Bronze. Completely guaranteed.

Dealerships and literature available.

CENTRAL Safety Equipment Co.

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Circle Item No. 192—Reader Service Card

Circle Item No. 193—Reader Service Card

vaporizing-liquid extinguisher. These are the smallest sizes approved for industrial use.

Refuel gasoline trucks in a safe location away from storage and manufacturing areas—preferably outdoors. Shut off the engine during refueling and avoid spilling fuel or overflowing the tank.

Collisions may damage fire-protection equipment. Lift trucks have been known to break sprinkler pipes, causing heavy damage to stock.

Waterproof Covers for Men and Materials

Waterproof covers of several types, commonly called "tarpaulins," often are needed to protect materials and equipment against water damage in case of fire. These covers are also useful for other emergencies, such as breaks in piping or when rain enters through broken windows or torn roofing during a windstorm.

Covers are especially needed in buildings where machinery, equipment or stock may be damaged by water. Such stock includes textiles, paper goods, hardware, foodstuffs, dry chemicals, leather goods, furniture, and other high-value materials. Areas in multistoried buildings where floor leakage is likely should have waterproof covers.

Covers of treated water-resistant canvas come in sizes up to 24 x 36 ft. Flameproof materials are also used.

Polyethylene sheeting is used for some purposes. These transparent covers are nonconductors of electricity. They are used sometimes by public-utility companies for protecting linemens' repair work. They are also used for covering boats and trucks and for other specialized uses.

Polyethylene film, available in large sheets, can be used over light wooden framework to form a shelter for construction work. The film remains flexible in cold weather.

Watchmen and responsible plant employees should be instructed in prompt use of covers.

Preventing Welding And Cutting Fires

All welding and cutting operations should be restricted to a specified area. Before portable units

TOKHEIM High-Vacuum

HAND PUMPS

for industrial liquids

Here's an all 'round utility pump that saves much more than its cost in speeding production, improving housekeeping, preventing waste. Eliminates slippery floors and liquid accumulation so often the cause of fire and accidents. Delivers 20 gallons per 100 back and forth strokes. Pumps oil and many other liquids. (Write for approved list.) Has hose or spout outlet. Call your dealer, your Tokheim representative, or write factory.

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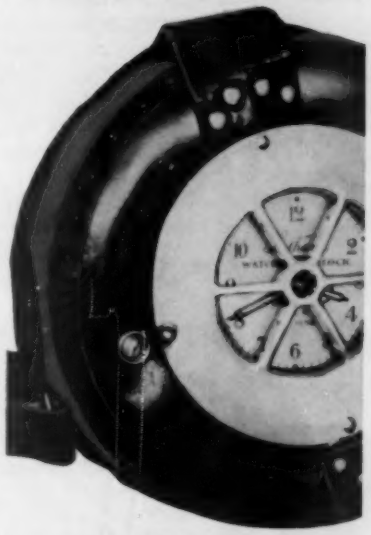
In Canada: Tokheim-Reeder of Canada, Ltd., 205 Yonge St., Toronto, Ont.

Circle Item No. 195—Reader Service Card

reduce risk



of fire and theft with the

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. . . underwriter-approved and in your choice of two models.

Protect your property, your investment . . . reduce your insurance rate, the risk of fire and theft with your watchman recording his rounds on a Lathem Watchman's Clock.

The Vanguard permits you to keep three days registration on a single dial . . . eliminates the need for a change of dial over weekends and holidays. The economical Sentry carries a standard 24-hour dial. Both feature the same precision workmanship, and can be furnished with up to forty station keys. Your Lathem Watchman's Clock has a leather carrying pouch, 8-day jewelled movement and is housed in a hermetically sealed, shock-proof aluminum case. Write today for full information.

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Gentlemen: Without obligation, please send me full information about Lathem Watchman's Clocks, including prices.

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STREET_____

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may be moved, written consent of a qualified official must be secured. The location must be carefully examined before signing permit.

No cutting or welding should be done while sprinklers are out of service.

Equipment must not be used in presence of flammable vapors and liquids, or on tanks which have contained such materials.

Floors and surroundings must be swept clean and wet down. All combustibles should be relocated at least 30 ft. away. Remainder should be covered with asbestos curtains, metal guards or flameproof covers (not ordinary tarpaulins).

Extra men should be provided to watch sparks. Ample fire protection equipment, such as hand hose, extinguishers or water pails should be provided.

In combustible buildings, men should be stationed on the floor below and possibly on the floor above. The areas including the floors above and below the one on which the operation is performed should be patrolled for at least half an hour after the work is completed.

If near the shutdown period, remaining employees or watchmen also should be notified.

Cutting and welding equipment should be kept in good repair. Soapy water should be used in testing for leaks.

Protection Against Wind

Severe windstorms may occur in any section of the country, and the menace is not limited to any season. Tornadoes and hurricanes are more frequent in the milder months, while blizzards cause heavy damage in the northern sections during the winter.

Roof coverings, copings, and flashings are especially vulnerable. In addition, outside structures such as stacks, ventilators, canopies, signs, and cranes should be designed and anchored to resist wind, and should be maintained.

Wood- and steel-deck roofs need special anchorage to resist lifting by strong winds. Standard roof anchorage is designed to resist gust velocities of 90 mph. In most cases this will protect against minor tornadic storms and will reduce the extent of damage outside the vortex of a severe tornado.

Safety Applications of Photoelectric Cells

1. Protection of machine operators; guards for power presses and similar machines.

2. Protection of plant and personnel by detection of:

a. Flame failure on oil- and gas-burning furnaces.
b. Poisonous gases; measurement of dust contamination in atmosphere.
c. Smoke or flame.

3. Protection of machinery against damage by:

a. Switching off power should work become jammed.
b. Declutching forging presses when object is below working temperature.

4. Alarm devices for protection of property and personnel:

a. Protection against high-voltage test equipment.
b. Overrun on cranes.
c. Height gauge for loaded vehicles.
d. Burglary and trespassing.

Circle Item No. 196—Reader Service Card

"If we had had Exide Lightguard we would have saved many times the cost—by preventing losses from pilferage, damage and injuries in this single power failure."

Don't let it happen to you. Install Exide Lightguard.* Plug into regular outlet—it goes on automatically when lights go out. Built-in automatic charger. Batteries last for years. Choice of several models. Be protected against panic, theft, damage, personal injuries. For full details, write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

*Reg. TM Electric Storage Battery Co.

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to make your plant SAFER...

Be sure to investigate Conductometer®, the easy-to-operate device for measuring the electrical resistance of flooring, personnel and equipment. A necessity where gases and explosives are used or stored. Helps prevent dangerous and costly explosions. U.L. Listed. Meets N.F.P.A. Requirements. Write for free details now.

As a further step toward greater plant safety inquire about the special conductive floorings and finishes manufactured by our business affiliate, Federal Flooring Corporation.

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SECTION 10

NUCLEAR RADIATION

IN SECTION 10

Film Badges and Dosimeters . 255
Bio-Assay 256
Instrumentation 256
Decontamination 258
External Protection 261
Laundry 261

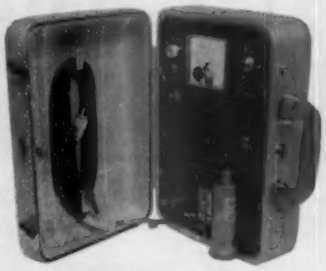
WHEN THAT AWESOME cloud rose over Hiroshima, radiation ceased to be a laboratory phenomenon and became a household word.

A more quiet drama had been playing, however, for half a century. Radiation experimenters and X-ray machine operators were exposed to the invisible bombardment for decades. Gradually the realization came that people had to be shielded from this force. The tragedy of the radium dial painters was the final proof.

When the atomic energy industry emerged, its safety procedures had already been worked out. The key was equipment—sensitive instruments that could see the invisible bullets and hear the inaudible crash of submicroscopic particles.

RADIATION MONITORING INSTRUMENTATION

UNIVERSAL TRANSISTOR PRODUCTS CORP.



Model—UTP 420 $435.00

UNIVERSAL'S *transistorized* GAMMA MONITORS

Models UTP 420 and UTP 408—Used to monitor contamination in Radio-Isotope Laboratories, Medical and Reactor Installations.

RANGES: Three: X1, X10, X100
COUNTING RATE: 0-500; 0-5,000; 0-50,000 cpm (Model UTP 420)

Sensitivity: 0-0.5 mr/hr; 0-5.0 mr/hr; 0-50.0 mr/hr (Model UTP 408)
AUDIO-VISUAL ALARM: Model UTP 420

Model—UTP 408 $185.00

UNIVERSAL'S *transistorized* X-RAY and GAMMA-RAY DETECTOR

Universal's 607-X is designed with specially constructed internal shielding so that the unit can make accurate X-ray measurements (±15% over the energy level 100 KEV-600 KEV) in the presence of high intensity RF pulses or other types of electromagnetic, magnetic, and electrical fields.

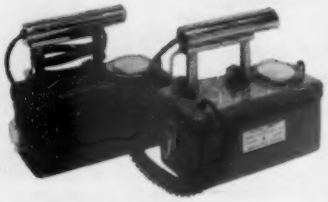
Model—UTP 607-X $1750.00

MODEL 607-X SPECIFICATIONS

RANGES: 0-1 mr/hr; 0-10 mr/hr; 0-100 mr/hr. Plus additional switch positions for battery test and self-calibration.

X-RAYS: Measures RF AC and DC X-Ray Sources. Plused X-Ray sources to 500:1 duty cycle.

ACCURACY: ±15% from 100 KEV to 2 MEV energy level. ±40% or better from 50 KEV to 100 KEV energy level.



Model—UTP 700 $109.50

UNIVERSAL'S *transistorized* BETA GAMMA MONITORS

Models UTP 407 and UTP 700—Compact highly efficient all-transistorized radiological survey meters that meet requirements and specifications of the U. S. Government.

SENSITIVITY RANGES: Three: 0-0.5 mr/hr; 0-5.0 mr/hr; 0-50.0 mr/hr.

Model—UTP 407 $89.50

UNIVERSAL TRANSISTOR PRODUCTS CORPORATION

36 SYLVESTER STREET, WESTBURY, LONG ISLAND, N. Y.

EDGEWOOD 3-3304

Nuclear Radiation

An unseen, but no longer unknown, hazard

EARLY radiation workers did not know the dangers involved in the materials they worked with, and frequently suffered radiation sickness and injury.

A year after Roentgen discovered X-ray, a British writer proposed that a few minutes' exposure to this new force at bedtime would make it possible for a man to remove his whiskers with soap and water the next morning. Many radiation workers and medical personnel contracted cancer, blood diseases, and cataracts, and died before their time because of the effects of radiation.

Today, it has been demonstrated that work in the presence of radiation can be even less dangerous than the same type of work without radiation. This unexpected result is probably due to the effect of radiation safety precautions on the overall safety program.

Above: Film badge worn on the wrist, and a ring badge. (R. S. Landauer Jr. and Co.)
Left: A two-film badge. One film remains in the badge to be read after 13 weeks for 13-week total. (Tracerlab)
Right: A dosimeter used to protect the wearer from radioactive isotopes and from X-rays. (Bendix Aviation Corp.)

Personal Protective Devices

Film Badges. There are numerous devices used to measure a radiation exposure of the individual. Perhaps the most widely used is the film badge.

Film badge services are designed to provide measurement of the exposure to ionizing radiation which personnel receive in working around X-ray equipment, radioactive materials, or any other source of beta, gamma, or X-radiation.

Each exposed person is provided a small badge which contains special photographic film emulsions (in a light-tight wrapper) and one or more radiation absorbers shielding part of the film. These badges are worn when exposure to radiation is possible during work. The radiation, if any, will penetrate to the film, leaving a latent image.

Upon development, the latent image will appear as darkening on the film. The amount of darkening is proportional to the amount of radiation which penetrates to the film. The badge absorbers will shield out varying amounts of the radiation resulting in less darkening of that area of the film below the absorbers. The amount less will depend upon the energy and type of radiation. Film areas having no shielding may be compared against areas having absorbers of various types.

By determining the darkening below the various absorbers, the type and energy of the radiation may be estimated. The density values are then compared with those of the film badges exposed to normal amounts of the radiation of the same energy, and an estimate of the exposure value is arrived at.

In general, film badges are processed and read by an outside service company trained and equipped to handle the special problems involved. Such a film badge service offers a distinct aid in employee protection and serves to establish reliable primary records of radiation exposure directly correlated with each individual.

Usually, films are processed weekly and exposure values for each week then determined and reported.

Badges are available for the wrist or for a finger in situations where the hands come close to the source of radiation exposure, for example, in operations requiring use of hands in exposures considerably in excess of that received by the body as a whole.

Film badges are an economical means of permanently recording the degree of hazard. The information obtained can be used to correct radiation safety deficiencies and provide evidence of diligence in keeping exposures to acceptable levels in the event of litigation over radiation exposures.

Mere subscription to a service is not always sufficient protection. The processor's experience and competence may become points of issue. His methods must include the use of a densitometer and control films exposed to various types of radiation. The actual films, not just the report, must be available as evidence. Some recommend that extensive records of the processing conditions be kept. Identification of the film as the one actually worn by the subscriber must be positive.

Dosimeter. The word "dosimeter" usually means the pocket-type electrometer worn on the person as a

Workers properly dressed and equipped for the job of monitoring a contaminated area. (Acme Protection Equipment Co.)

fountain pen is worn. In first cost, it is more expensive than the film badge type of dosimeter. A common dosimeter is calibrated in 20 mr steps from zero to half a roentgen. Low energy radiation may not be measurable by all types of dosimeters.

The wearer can hold the instrument up to the light at any time and determine whether he has received a sudden or heavy dose, or if he is getting close to his allowed weekly exposure. This device has been compared to the automobile odometer —it indicates cumulative radiation as the odometer indicates total mileage.

For known low-level work, the film badges and dosimeters worn by employees may be the only instrumentation needed.

Dosimeters are more reliable when worn in pairs so one instrument is a check on the other. Sometimes a high reading appears that proves on investigation to be invalid. Some accidental discharge may occur when certain types of dosimeters are dropped. After each shift, dosimeters are read, the results recorded as is the case with film badges, then reset with a charger.

Film badges and/or dosimeters should be issued to all personnel working in areas where experience or surveys with appropriate instruments indicate actual or potential exposure. Some individuals may be required to wear a film badge that is developed and replaced periodically, and two pocket dosimeters.

A company that processes its own film badges has direct supervision over the quality of the work and can process and read the film immediately. On the other hand, in theory, at least, it can be an advantage to have an impartial third party testifying as to procedures in case of litigation.

Special Equipment. Some items of specialized personal protective equipment that may be needed are rubber gloves, disposable clothing, and approved respiratory devices. Some solid materials, such as normal uranium and its alloys, may be handled for short periods without glove protection.

Ventilation

Glove Boxes. Some materials can be handled in special enclosures called glove boxes or dry boxes. These provide a special atmosphere of manageable size just as a window greenhouse does for the orchid enthusiast. A glove box has its own air supply, exhaust system, and lighting.

Filters. Efficient filters are vital in preventing release of contamination. Tested filters may be purchased. Special filters may be tested by companies selling the service.

Waste Disposal

Waste disposal is an ever-present problem for the plant working with radioactive materials. Dry active waste must be held in airtight steel cans. Liquid wastes can be collected in holding tanks, and later evaporated to minimum volume for disposal.

Bio-Assay

Bio-assay is the most widely used method for estimating radioactive burden deposited in humans. The most common analyses are of breath and urine. Although a large fraction of the total soluble material is rapidly eliminated from the body in urine, the remaining amount becomes incorporated in the body and is passed at a rate which depends on both the specific material involved and the biological residence time of the material in the skeleton and various body organs. The period of slow elimination may last either for a few months for loosely-bound materials, or years for more tightly-fixed species. Urinalysis can be used to estimate radioactive materials within the body.

Bio-assay samples should be scheduled according to the potential exposures. Two or three analyses per year per exposed employee are recommended until experience indicates that the schedule should be increased or decreased. For some employees, very infrequent analyses may be adequate. In addition, a sample should be taken during preplacement examinations and on termination.

A side benefit of bio-assay may be the improvement in attitude of a radiation worker who has slipshod habits if bio-assay results show a positive uptake of activity in his body.

Some commercial laboratories provide analytical service for bio-assay specimens.

Other services available are:

1. Environmental activity surveys including sample collection and analysis of air, smear, water, soil, vegetation, animal tissue, and milk.
2. Urinalyses for gross radioactivity or specific radioisotopes.
3. Special analysis for radioactivity in blood, feces, saliva, mucus, and breath.
4. Procedure development.
5. Procedure manuals.
6. Decontamination.
7. Radiation hazard evaluation for legal, insurance, and public relations programs.
8. Consulting.
9. Complete health physics programs.

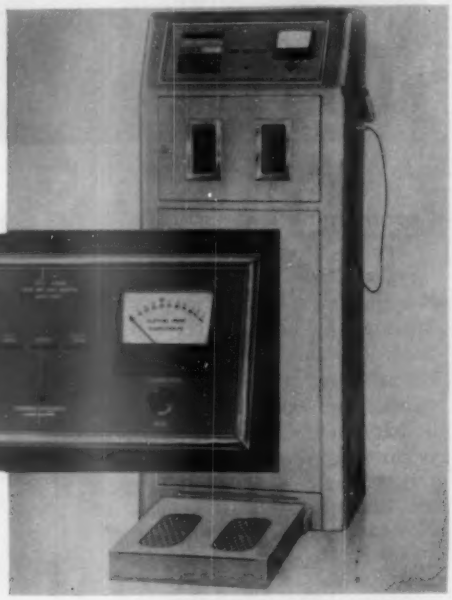
Instrumentation

Although radiation is not detectable with the senses, the hazards are more controllable than many other hazards because proper instruments

Chemist handles strontium 90 in air- and moisture-tight glove box. (Shell Oil Co.)

"Cutie Pie" portable alpha, beta, and gamma survey meter at left. Inset shows alpha rejection absorber and beta absorption filter locked at side of chamber. At right, "Juno" radiation survey meter. Primarily intended for inspection of flat surfaces, it can be used for other types of checking, too. (Technical Associates)

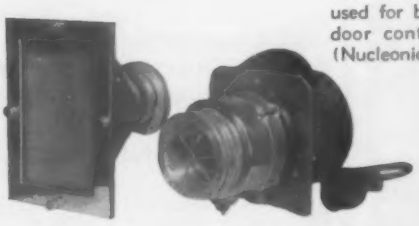
Tritium monitor. (Atomic Accessories)



Beta-gamma hand and shoe monitor. (Technical Associates)

Shoulder bag battery air sampler. (Gelman)

Portable 24-hour air sampler used for both indoor and outdoor contamination control. (Nucleonic Corp. of America)



Battery operated Geiger-Muller survey meter for measuring alpha, beta, and gamma radiation of low and medium intensities. (Nuclear-Chicago Corp.)

make it possible to measure the degree of danger.

Not only amounts, but different kinds of radiation can be detected with proper instrumentation. Some instruments do one job only—others detect several types and levels of radiation. It is possible to buy an instrument for low-level alpha radiation, for instance. A more versatile instrument is the alpha-beta-gamma survey meter. It is useful in checking hands, bench tops, coats, and equipment for contamination and in locating relatively small amounts of spilled radiochemicals.

Proper instrumentation is vital to measure and control the dose of penetrating ionizing radiation, especially to the lenses of the eyes.

It is also most important to prevent radioactive materials from entering the body through the lungs. Routine air sampling or a constant air-monitoring may detect releases.

Several air samplers are available. They may be purchased complete, or the parts may be ordered separately. If a direct recording instrument is not purchased, particulate contamination may be collected on filter paper. The filter paper must then be counted with a system for alpha or beta-gamma counting, such as a scaler, alpha probe, or beta-gamma tube. Gas flow proportional counters are also available. Radioactive gases may be collected in evacuated bottles and later measured. Some direct measuring instruments are also available.

Air samplers designed for constant flow enable the user to determine exactly how much air the sample came from and give a true time average of the changing concentrations of contaminants in air.

If large numbers of employees must be checked in a short period, as at a shift break, hand and shoe counters may be justified.

A vest-pocket-size dose-rate alarm that gives a signal audible several feet away has been developed. The transistorized unit weighs less than 7 oz. The device can also give a visual alarm.

The amount of the various radioisotopes which may be discharged into sewer systems has been determined by the AEC. Effluent may be checked by continuous liquid monitoring systems.

Circle Item No. 199—Reader Service Card

Stop Worry About Radiation Hazard

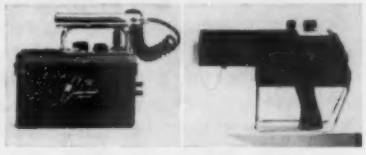
Everyone who works with X-ray equipment or around radioactive materials is concerned about radiation exposure and its effect on their health. Stop this worry with protective Nuclear-Chicago film-badge service; a low-cost, accurate service providing a permanent record of radiation exposure. Careful, precise interpretation of the film at Nuclear-Chicago's modern laboratories guides you in correcting hazardous working conditions around radiography equipment and radioisotopes—lets you know the exposure received and protects in litigation.

Here's how it works. You order one film-badge for each person to be checked, then return badges to us weekly (or other selected periods). You receive a report promptly showing radiation exposure of each badge.

Here's what it costs:

No. Badges Per Shipment	Charges Per Badge
1	$1.50
2	1.00
3-5	0.85
6-9	0.75
10-24	0.65
25-49	0.60
50-99	0.55
100-up	0.50

WE OFFER, TOO—



Radiation Survey Instruments

Precision Equipment for the Industrial Laboratory

Nuclear-Chicago manufactures a complete line of radiation detecting and measuring devices for installation monitoring, general survey studies and industrial research. Portable survey meters, pocket dosimeters, scalers, ratemeters, and other precision nuclear instrumentation are explained in detail in our General Catalog R. Write for this catalog and full information on film-badge service.

nuclear-chicago CORPORATION

319 E. Howard Ave., Des Plaines, Illinois

Professional decontamination team and equipment. (Tracerlab)

Decontamination

The important thing about a spill of radioactivity is to be ready for it. A spill is most likely to occur where unsealed radioactive chemicals are used. Liquids and powders, of course, are more likely to cause trouble than solid sources of radioactivity. Contamination can also occur because of:

1. Power or mechanical failure in the laboratory exhaust system. This may cause a rapid buildup in airborne radioactivity.
2. Volume reduction evaporation of uncovered radioactive liquids.
3. Radioactive powders made airborne by gusts of air.
4. Chemical explosion.
5. Breaks in vacuum equipment.
6. Accidental volatilization of radio-chemicals.
7. Mechanical damage causing rupture and resulting in leakage from sealed sources, particularly radiography, clinical, or beta gauge sources.
8. Fires which consume radioactive materials and result in the release of

Two shirt-pocket-size alarms. This type of warning device gives an immediate warning. Top: The "Sparrow." Bottom: "Fido"—for "Fallout Intensity Detection Oscillator." (Gelman Instrument Co. and Controls for Radiation)

FILM BADGE MONITORING PROVIDES GREATER SAFETY IN NUCLEAR OPERATIONS

X-RAY MONITORING OFFERS THE FINEST FILM BADGE SERVICE EVER CREATED TO INCREASE THE SAFETY FACTOR FOR PERSONNEL WORKING IN NUCLEAR & X-RAY OPERATIONS

One Low Subscription Fee Pays For All!

- Written Reports Within 24 Hours
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- Maximum Protection
- Telephone Notice In Case Of Overexposure
- Complete Peace-Of-Mind

For Further Information, Contact:

X • RAY MONITORING CORPORATION
43 West 61st Street, New York 23, N. Y.

Circle Item No. 200—Reader Service Card

radioactive gases or particles. Fires are particularly hazardous, for the water used to extinguish them may cause further spread of the contamination.

Regardless of how the contamination occurs, prompt discovery is important in minimizing damage. Properly trained personnel and continuous routine monitoring procedures make it possible to deal with an accident with the necessary speed.

When a serious release of radioactivity occurs:

1. Notify the health physics officer, industrial hygienist, or radiation safety man.
2. Shut off all ventilation in the affected area. Close doors and windows, cover air ducts, shut off all fans, shut down any air-conditioning equipment.
3. Shut off the water supply to the affected area.
4. Close the valve, if any, on the sewerage line from the area, if it leads to a public disposal system.
5. Evacuate all personnel.
6. Seal off cracks in doors and windows with masking tape, and post "Danger" or "Off Limits" signs.
7. All persons in the affected area should shower and be monitored for contamination. Secure medical aid, if necessary.
8. Monitor all personal effects, clothing (especially shoe soles), and tools before reusing.
9. Arrange for urinalysis or bioassay of specimens from exposed personnel if these are considered necessary.
10. For a serious spill, other notification may be necessary or desirable. Check this out in advance with the AEC or others who may be able to help in the evaluation of conditions or in providing emergency monitoring assistance.

People working with radioactive materials should have "spill drill" often enough so they know exactly what to do with the greatest speed. They should know where all switches are located, and know how to shut

Radiation warning tape is a series of individual labels 3 x 1 in., printed in standard AEC colors on a continuous roll of tape. Individual stickers with removable paper back can also be used for labeling small bottles, boxes, and source containers. (Nuclear-Chicago Corp.)

DANGER
HIGH VOLTAGE
KEEP AWAY
ELEVATOR
RADIATION ZONE
NOTICE
CLEAN ALL EQUIPMENT AFTER EACH DAY'S WORK
NO SMOKING
SAFETY FIRST
HELP KEEP THIS PLANT SAFE AND CLEAN
RESTRICTED AREA
AUTHORIZED PERSONNEL ONLY
CAUTION
LOCK ELEVATOR BEFORE LOADING AND UNLOADING
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• explosion
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READY MADE SIGN COMPANY, INC.
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1 . . . . . ONE DEPENDABLE SOURCE FOR ALL NUCLEAR RADIATION SAFETY EQUIPMENT

Protect your personnel against the hazards of radioactivity. Atomic Accessories, Inc. offers the most comprehensive selection of top quality, safety equipment and monitoring instrumentation.

Survey Meters • Remote Handling Tools Dosimeters • Warning Signs & Tapes Decontamination Equipment • Tritium Monitors • Lead Shields & Containers Radiation-Equivalent Manikins • Lab Monitors • Air Samplers • Others

For full information ask for our Catalog BN

FILM BADGE SERVICE

- Cumulative Dosages Reported.
- 24 hr. beta-gamma service; 72 hrs. for neutrons.
- Analyses by a Registered Radiation Physicist.
- Clip-on, wrist or ring badges.
- Low Cost . . . Accurate . . . Reliable . . . Speedy.

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Dry active waste container. (S. Blickman)

them off as quickly as possible. These switches and valves should be prominently labeled.

For the cleanup, there are legal and psychological advantages and disadvantages in having outside decontamination specialists do the work. This possibility should be considered at the outset of the work.

To prevent the spread of contamination, special clothing marked for wear only in contaminated areas should be worn by workers in the area. Anyone leaving should be monitored.

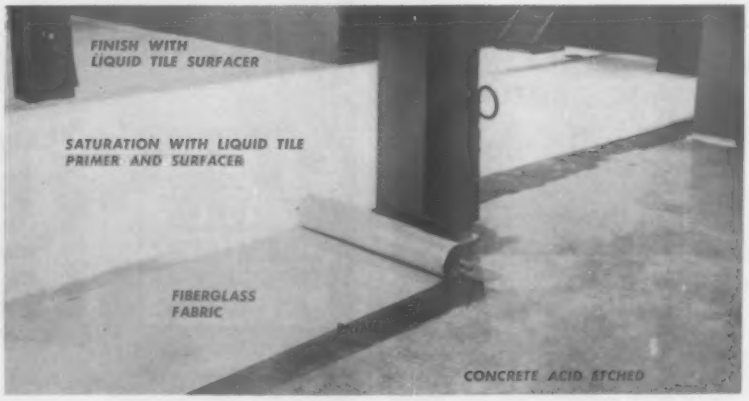
Where spills are likely to occur, surfaces can be protected by paper, which can be disposed of in the dry active waste. Sometimes special strippable paints are used for walls so the wall surface can be taken off and properly disposed of.

This, of course, involves repainting to protect the porous surface underneath. If a non-porous surface can be applied in the beginning, normal cleanup procedures can remove contamination. One surface that can be applied over normal building materials is a thermal-setting plastic that cures into a chemical-resistant, non-porous coating. This material has been used for walls and ceilings of hot cells, laboratories, corridors, shower rooms, washrooms, and locker rooms. With a fiberglass reinforcement, it is used for floors that must resist deep contamination.

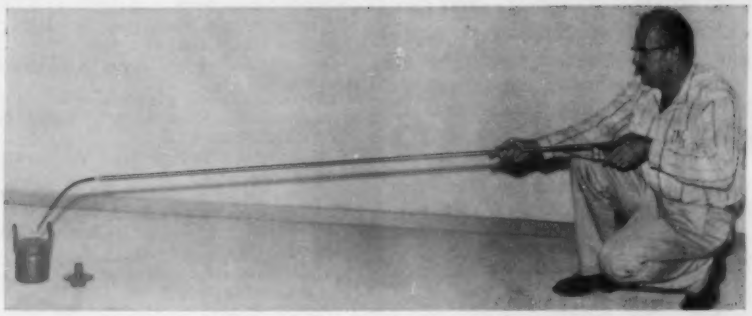
It is obvious that ordinary cleaning tools such as brooms are not to be used in cleaning dry contaminated surfaces. An explosionproof vacuum cleaner with special fine filters can be used to remove radioactive dust. Wet system vacuum cleaners have been used. For major spills, very careful preliminary cleanup is essential.

Vacuum cleaning laboratory surfaces. (Hild Floor Machine Co., Inc.)

Fire and Explosion. Normal fire prevention procedures can eliminate some of the most serious contamina-



Steps in applying contamination-resistant liquid tile floor. (Evershield Products)



Tongs provide vital distance for protection. (U. S. Nuclear Corp.)

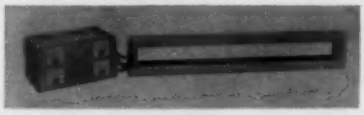
tion hazards. Smoke can carry activity hundreds of feet, if a fire occurs around some radioactive materials. An explosion can raise tremendous quantities of radioactive dusts from surfaces where it has settled. Serious inhalation hazards can result from even a small explosion. Early fire warning and fire control becomes even more important where radiation is involved.

External Radiation Protection

Distance. Time, shielding, and distance are the three means of protection from external radiation, which must always be considered separately from the problem of internal radiation. A little distance goes a long way in increasing safety. The rate of exposure falls off rapidly as we move back from the source of radiation. This is the reason for the widespread use of tongs and remote handling equipment.

Shielding. No shield will stop all penetrating or "hard" radiation, but it is possible to stop all but an insignificant amount. There is a variety of shielding materials. Where it is desirable to see through the shield, water or transparent solutions can be used. Where space is limited, an extremely dense material such as lead is more practical. Lead has its limitations in most buildings of conventional construction because floor loading capacity may be a limiting factor.

Time. Sometimes the easiest thing to do in a cleanup is to wait for the radioactive material to decay significantly. If the material has a short half-life, the room can be back in use soon. If the half-life is 24 hours, the activity will be less than 1 per cent in a week.



Laundry monitor. Detector frame contains 16 Geiger tubes. Used for rapid checking of work clothing and laundry for contamination. (Nucleonic Corp. of America)

Laundry

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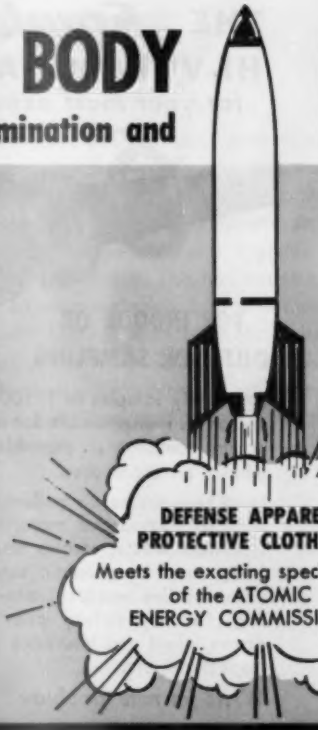

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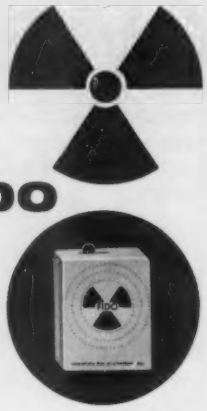

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of contaminated clothing. Protective clothing can be rented, kept in repair, and cleaned regularly by an industrial laundry equipped with its own laboratory, waste disposal facilities, and monitoring equipment. The user should make certain that operations are performed according to city, state, and AEC regulations.

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SECTION 11

MEDICAL and HEALTH SERVICE

IN SECTION 11:

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INDUSTRIAL MEDICINE provides "preventive maintenance" for the people who carry on the world's essential work. It has gone far beyond its original function of patching up industry's casualties, although that service is not likely to become unnecessary.

Keeping the workplace safe and hygienic calls for both medical and engineering knowledge. This has become increasingly important and difficult as new materials and processes involving known and suspected health hazards have been introduced.

Medical departments have achieved a high degree of control over these hazards through examination, placement, and health supervision over the individual worker and through supervision of manufacturing processes.

Medical and Health Service

HEALTH MAINTENANCE for employees, through the prevention as well as the treatment of both disease and accidents, is the goal of industrial medicine. The medical department plays a major part in accomplishing this through:

1. Supervision of processes and the working environment to provide safe and healthful working conditions.
2. Services for the treatment of occupational illness and injury.
3. Supervision of the health status of the individual through examination, counseling, and placement.
4. Health education.

New processes and materials with actual or potential health hazards have brought additional problems to the medical department. To study hazards and devise protective measures for those who manufacture the products and those who use them, some large corporations maintain industrial hygiene laboratories.

Smaller companies obtain help on medical and health problems from insurance companies, state departments, laboratories maintained by universities and research organizations, and from consulting industrial hygienists.

Scope of Program

Industrial medical service requires an organized plan and it must have management's full support.

Essentials of the program are:

1. A staff of qualified physicians, nurses and attendants.
2. Adequate facilities conforming to standards established by the Industrial Medical Association.
3. Effective care of occupational injuries and diseases.
4. Reasonable first-aid treatment for nonoccupational injuries and illnesses while on the job.
5. Physical examinations — pre-employment and periodic.
6. Adequate records of treatments and individual medical histories. Medical records should be kept confidential.
7. Supervision of plant sanitation and hygiene measures.
8. Instruction of employees in personal health and safety.

Industrial medicine recognizes the place of the private practitioner in providing medical care for the employee and his family.

Hospitals. Use of community hospitals, where available, is usually more desirable than setting up elaborate in-plant facilities for surgery and treatment of serious cases.

The Staff

The medical director. Health and medical services should be under the supervision of a physician. Management and the medical director can formulate workable policies.

Medical assistants, consultants, nurses, and others should be selected on the recommendations of the medical director.

A full-time physician may be warranted by size of the plant or nature of its operations. Sometimes a plant physician engages in private practice with the company's approval. He may devote part of his time to the industrial organization, assuming supervisory responsibility and delegating detail work to qualified assistants.

The nurse. Most industrial nurses are employed by companies which have single-nurse dispensaries and a part-time physician. The nurse is assistant to the physician and his representative when he is not at the plant. She is also friend and confidant of the employees.

Where the nurse is the only full-time person in the dispensary, her duties include:

Pre-employment examinations help safe placement of employees. Periodic check-ups are needed where health hazards exist.

1. Maintaining supplies and equipment.
2. Providing first-aid care for injuries and emergency treatment of illnesses as authorized by the physician in charge.
3. Assisting the physician with medical examinations.
4. Participating in the health and safety program.
5. Promoting health education and counseling employees on personal-health problems.
6. Taking part in welfare activities.
7. Keeping adequate dispensary records. Paper work should not be permitted to interfere with professional duties.
8. Being familiar with the plant and its hazards through plant tours.

The health program may require the services of other specialists, such as industrial hygienists, safety engineers, and sanitary engineers.

Cooperative services. Where several small plants are close together a cooperative medical service program can often be maintained. A central dispensary with necessary personnel and equipment is maintained. Adequate service can be provided at moderate cost.

Physical Examinations

Pre-placement examinations are standard procedure in many companies. Their purpose is to place each employee in a job suited to his capacity rather than to bar anyone from a job.

Periodic checkups are desirable, particularly for elderly employees, for those in jobs where safety depends on physical fitness, and where there is exposure to health-hazardous materials.

Examinations include vision, heart, chest, blood pressure, hearing, and urinalysis. Tests in some industries require elaborate laboratory facilities and highly trained personnel.

Laboratories. For most industries, facilities for taking urine tests and blood counts are needed. Blood serum samples can be sent to a laboratory for analysis. Where a large volume of toxicological tests is conducted, a plant laboratory may be desirable.

Vision. Several devices for testing visual acuity and classifying workers for jobs are available. These devices can be used by trained laymen. Employees showing visual defects are referred to ophthalmologists or optometrists for further tests.

Hearing. By means of the audiometer, acuteness of hearing can be determined and any necessary treatment indicated. Progressive loss of hearing, through noisy work or other causes, can be measured.

Chest. For many occupations, pre-employment and periodic examinations include chest X-rays. Mass chest surveys are made at regular intervals in industries where health hazards require frequent checks, and in public health campaigns to detect incipient cases of tuberculosis and cancer.

Trained technicians with mobile equipment can be engaged to conduct mass X-ray surveys.

Consultants

The medical director, like the private practitioner, is not an expert in all branches of medical science. Both find it necessary at times to call on specialists when diagnosis is uncertain or treatment requires specialized techniques.

Surgeons. In all surgical cases where there is danger of inaccurate diagnosis or inadequate treatment, an outside consultant should be called promptly. Frequently, the administrative and diagnostic ability of the medical director is more important than skill in surgery. The plant physician should refer all cases which might be beyond his training and experience to a specialist or surgeon.

Oculists. One of the most frequent occupational injuries is to the eyes. The importance of one's eyesight justifies obtaining the highest available skill. Specialists should be summoned in all potentially serious cases.

Ophthalmologists and optometrists also can serve industry in correcting defective vision among employees. The employee should, of course, have the privilege of choosing his own refractionist, but frequently he will ask advice of the medical department on selection of a specialist.

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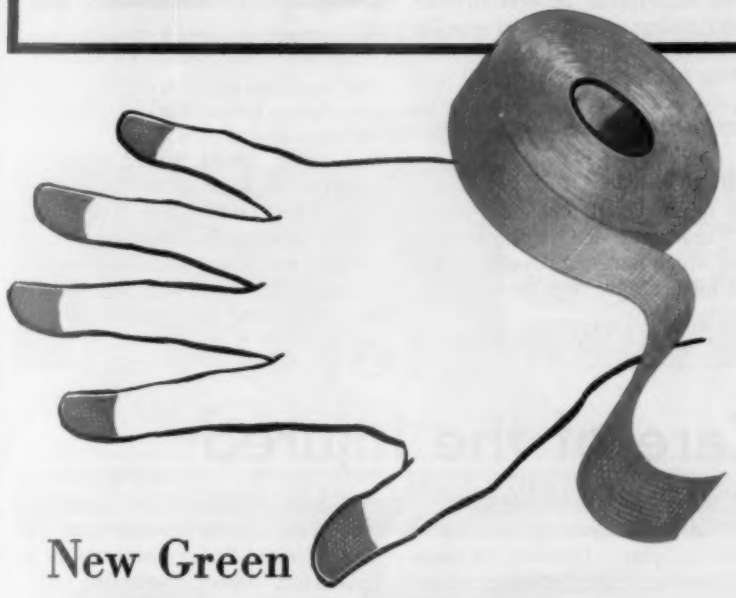

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Where prescription goggles are indicated, some companies provide the examination.

Dentists. Injuries to the teeth are relatively infrequent in industry. Such cases usually are sent outside for treatment. The medical department should have a list of dentists qualified to treat such injuries.

The importance of oral hygiene has led many companies to provide dental examinations, sometimes including full-mouth X-rays and oral prophylaxis. Findings are usually referred to the employee's dentist.

An electrocardiogram is an important part of a complete medical examination.

Mobile Clinics

A recent development in industrial health service is the mobile clinic which makes it possible to extend medical coverage to more employees.

The simplest type, which consists of a trailer towed behind a car, is equipped to give some of the simpler tests. More elaborate is a bus-type vehicle housing facilities for visual, hearing, and X-ray examinations. It is practically a self-sufficient medical department and laboratory on wheels. * * *

Care of the Injured

ACCIDENTS and sudden illness may occur wherever people work, travel or play. First-aid facilities that meet at least minimum standards should be available. Equally necessary is the trained person who knows what to do, and what *not* to do, in an emergency.

Prompt, skilled treatment has prevented many minor injuries from becoming serious. Sudden attacks of illness may occur anywhere, and the layman who can administer emergency treatment and get the patient to a physician can often prevent serious consequences.

A physician or nurse should treat injuries wherever possible. Companies which have trained large numbers of first aiders do not permit them to treat injured persons *if medical service is available*. Their training is strictly for emergencies.

Most injury cases, however, both on the job and outside, are first handled by laymen. The minutes before the doctor arrives may be vital. Many a life has been saved because some person on the spot was able to check bleeding, treat shock, or apply artificial respiration.

Many laymen acquired skill in first aid during military service and demonstrated the value of their training in combat. Many civilians have been trained by the American Red Cross and the Bureau of Mines in the United States, the St. John's Ambulance Association in the British Commonwealth, and by similar organizations in other countries.

Adequate care of the injured requires:

1. Trained attendants.
2. Clean, convenient quarters.
3. Equipment and supplies that meet medical standards.
4. Well-planned organization and procedure.

This discussion is concerned primarily with plants which must depend on trained laymen, or at most a full-time nurse and part-time physician rather than those with medical staffs and hospital facilities.

The staff. First-aid facilities should be under supervision of at least a part-time physician. A full-time registered nurse is desirable, even in a medium-sized plant.

If a full-time nurse is not practicable, at least two employees who have completed standard first-aid courses should be selected to carry on the work. They should be under supervision of a doctor or nurse.

Attendants should be allowed sufficient time from their jobs to maintain the first-aid room, check supplies and keep necessary records. An attendant should be available during working hours.

The Dispensary

A separate room should be provided, if possible. Patients should have reasonable privacy. If it is not practicable to partition the dispensary into a waiting room and a treatment room, a screen can be used.

The first-aid room should have:

1. Good lighting.
2. Adequate ventilation and comfortable temperatures.
3. Lavatory with hot and cold running water.
4. Quiet location.
5. Floors of durable and easily cleaned material.
6. Toilet facilities.

The first-aid room should be quiet, well ventilated and away from doors. Windows should be screened to keep out insects.

Furnishings should be simple and neat. The color scheme has an important influence on the patient. Walls painted with semi-gloss enamel in light tints of green, cream or buff are cheerful and easy to keep clean. "Hospital white" is no longer favored.

A patient who is nervous or in a state of shock may be upset still more by intricate patterns on walls and ceilings.

The floor should be resilient and easy to clean. Linoleum, rubber tile, vinyl tile, and asphalt tile are practical for dispensary use. A Sweeping compound, a vacuum cleaner with brush attachments, and damp or chemically treated cloths for dusting help to keep down dust.

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Equipment. For a dispensary with a registered nurse in charge under the supervision of a part-time physician, equipment might include:

1. Two white enameled chairs and a bench.
2. Enameled top table or desk.
3. Stool.
4. One or more beds or cots.
5. Linen and blankets.
6. Waste can with cover.
7. File for medical records.
8. Floor lamp.
9. Treatment table and instrument cabinet.
10. Medicine chest.
11. Small sterilizer.
12. Small items of office and surgical equipment, such as basins, pitchers, rubber gloves (sterile), scissors, tweezers, forceps, hot-water bottle or electric heating pad, ice bag.
13. Stretcher.
14. Telephone.

First-Aid Kits

If the dispensary is staffed by non-medical personnel, keep the set-up as simple as possible.

The supervising physician should be consulted about selection of materials, particularly when medication is involved. He should select such items as first-aid antiseptics and burn dressings.

Unit first-aid material is replacing bulk supplies for smaller plants, for small groups detached from a central headquarters, men working in isolated areas where medical help is not available, and on trains, buses, trucks, and airplanes.

Unit first-aid material is desirable because each dressing and treatment is an individual unit, for one-time use only. Materials can be kept sanitary for long periods. There is more likely to be a sufficient quantity and wider assortment of bandages.

To simplify maintenance of industrial first-aid kits and to establish commercial standards for sizes of unit cartons and kits, the Division of Simplified Practice, National Bureau of Standards, has compiled Code R178-41 in cooperation with industry.

Kit sizes and their contents are determined by the number of persons to be protected, with consideration to the nature and frequency of injuries likely to occur. Kits come in 10-, 16-, 24-, and 36-unit sizes. A 24-unit kit, for example, would be suitable for a group of 50 men.

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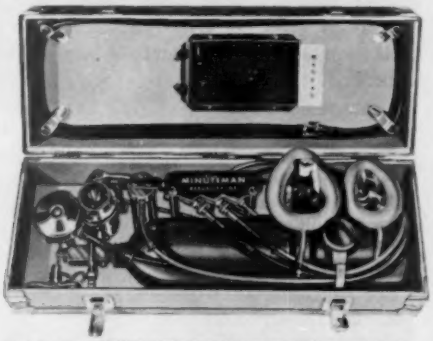

Here's the MINUTEMAN RESUSCITATOR in a nutshell:

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Well-equipped, attractive dispensary with clear glazed tile walls, acoustic ceilings and recessed fluorescent lights. Medical department includes convenient waiting room for employees. (The Austin Co.)

Specifications outlined in Federal Specification GGK-391 (Amended) are generally accepted and used by manufacturers in the production of unit first-aid material and kits.

For operations under federal regulation, assortments have been specified although these may not fit all local requirements. Contents of kits include:

Adhesive bandages
Burn compound
Burn solution
Petroleum gauze
Ammonia inhalants
Antiseptic swabs
Antiseptic applicators
Tincture green soap
Eye packets
Bandage compresses—2-, 3-, 4-in.
Tourniquet
Forceps
Scissors
Triangular bandages
Gauze pads
Gauze bandages
Gauze compress
Adhesive tape
Aspirin or other analgesic
Sodium bicarbonate tablets
Poison ivy ointment
Insect repellent

If poisonous snakes are likely to be encountered, a snake-bite kit should be included.

The unit system does away with many of the objections to first-aid kits, but a competent and conscientious employee should be responsible for dispensing supplies. Employees may help themselves, often for home use, and supplies may not be replaced. Also, self-treatment should be discouraged.

For the smaller plant, ideal quarters for a first-aid station may not be available but the best possible spot should be chosen. It should be readily accessible to the working zone and convenient for supervision and maintenance.

Hot and cold running water and toilet facilities are desirable for the small plant. Privacy is also important and a screen will do if a separate room is not available.

Equipment may be selected from lists suggested for dispensaries, keeping in mind limitations of space and requirements of the plant. The following are essential:

1. Desk or table for filling out reports and records.
2. Chair or stool.
3. Filing cabinet for records.
4. Waste can with cover.
5. Bulletin board.
6. First-aid manual.

Dispensary Records

Accurate records should be kept of treatments. If injuries are infrequent, a small day book may be sufficient, if kept systematically. Entries should include these details:

1. Date and time of injury.
2. Date and time injury was reported for treatment.
3. Name of injured.
4. Address of injured.
5. Where and how injury was received.
6. Names, addresses, and telephone numbers of witnesses.
7. Nature of injury.
8. Kind of treatment given, and by whom.
9. Did employee return to work after treatment? If not, when?

First-Aid Antiseptics

Infection in an open wound can be prevented by killing germs already present or by removing them mechanically and preventing entrance of more. It is in this second theory that soap and sterile water are used in aseptic treatment of wounds.

Thorough washing with soap will mechanically remove organisms and a sterile bandage will prevent entrance of more. Few are destroyed in the process by ordinary soaps.

Germicidal Soaps. Germicides, including phenol and mercury compounds, have been used in soaps but their effectiveness requires too high a concentration for ordinary use. But good results have been reported from hexachlorophene for general as well as surgical use.

Many substances will kill germs in a test tube but a first-aid antiseptic must kill them in the presence of

—To page 282

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Scott announces the Pak-Alarm, another "FIRST" in the safety equipment industry. This audible alarm, combined with Scott Air-Pak's present visual pressure gauge, produces an AUDIO-VIDEO Alarm System that insures unprecedented safety in Scott protective breathing equipment!

The Pak-Alarm is "cocked" when the cylinder valve is opened. Its loud, clear, minutes-long warning signal will "knock your ears off" and provides ample time for safe exit from hazardous atmospheres.

Pak-Alarm is connected directly to, and is actuated by, the air supply itself. It is extremely accurate and consumes virtually no air during its ringing period.

This "Dual Warning System" is good news for all Scott Air-Pak users. The optional Pak-Alarm can be easily attached to your present Air-Paks.

Ask your Scott distributor for a demonstration.

SCOTT AVIATION CORPORATION

211 ERIE STREET • LANCASTER, N. Y.

Export: Southern Oxygen Co., 250 West 57th Street, New York 19, N. Y.
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EMERGENCY OXYGEN

A Lif-O-Gen unit on hand means oxygen is available instantly—before regular oxygen therapy equipment can be brought into use. It's so compact and inexpensive that you can keep several kits spotted at critical points.

Anyone can operate the Lif-O-Gen unit. Press the nozzle on inhale, release on exhale. There's enough U.S.P. oxygen in the container to last through almost any emergency. A plastic face mask and tube are included, but the unit will also work directly through the nose or mouth.

A Lif-O-Gen unit is just under a foot high. It weighs only 20 ounces. It will fit into a briefcase, desk drawer, medicine cabinet, or locker. And it costs only $6.95.

...SECONDS AWAY!

Keep several units on hand at strategic locations. Lif-O-Gen units are readily available from your LINDE distributor. Or write Dept. LOG-1, Linde Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited, Toronto.

Linde

UNION CARBIDE

"Linde" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

Resuscitation Methods and Devices

PROMPT APPLICATION of artificial respiration has aided in the recovery of thousands of persons suffering apparent asphyxia. Training in resuscitation techniques is an important part of first-aid training.

Artificial respiration is helpful in the following cases:

1. When air is excluded from the lungs, as in near drowning, choking, strangling, etc.
2. When exposed to gases that displace oxygen in the circulating blood, as in carbon monoxide poisoning.
3. When exposed to oxygen-deficient atmosphere, as in silos, wells, vats, tanks, etc.
4. When the respiratory system is depressed or paralyzed due to electric shock, alcoholic intoxication, overdoses of certain drugs, etc.

Methods

For centuries men have been seeking improved methods of artificial respiration. Some of these were barbarous and superstitious; others had some scientific basis and were effective under favorable conditions.

Methods in current use may be classified as:

1. Mouth-to-mouth, mouth-to-airway or mask
2. Manual
3. Mechanical

Mouth-to-mouth resuscitation has been approved by medical authorities. Use of airway overcomes objections to this method. (Globe Industries, Inc.)

Any method is ineffective or of questionable value if the rescuer is unable to maintain an open airway. Even a relatively inefficient method may be effective if an open airway can be assured and treatment begun promptly.

Mouth-to-mouth (or mouth-to-nose). This method has been approved by the National Academy of Sciences-National Research Council Ad Hoc Committee as "the most practical emergency method for emergency ventilation of an individual of any age who has stopped breathing, in the absence of equipment or of help from a second person, regardless of the cause of cessation of breathing."

This method may be applied by breathing directly into the asphyxiated person with mouth-to-mouth contact, through an artificial airway, or into a mask. Techniques will be effective only if a clear airway is assured.

Manual methods. Two manual methods are currently recommended: the Holger-Nielson back-pressure, arm-lift method, and the Sylvester chest-pressure, arm-lift method. According to the *Supplement on Artificial Respiration* which now accompanies the American Red Cross first aid and water safety textbooks, these methods will continue to be taught and used when appropriate.

Mechanical Devices

These devices provide movement of air in the asphyxiated person by feeding oxygen. These are generally classified as inhalators, intermittent positive-pressure devices, and resuscitators (suck-and-blow) devices.

The inhalator is defined as a "mechanism providing continuous low pressure." Inhalators must be used in combination with some form of artificial respiration if the victim is totally asphyxiated. Inhalators are of value when the subject is capable of breathing effort, and requires oxygen above that normally in the air, for brief periods.

Intermittent positive pressure devices are defined as "mechanisms providing oxygen or other gas combinations under pressure for the inspiratory phase." The mechanism then shuts off and the expiratory phase is passive.

Combination resuscitator and inhalator administers oxygen while applying artificial respiration. (E & J Mfg. Co.)

The resuscitator is defined as a "mechanism which provides alternate positive and negative pressures and feeds oxygen or other gas combinations."

For first-aid purposes it is the consensus that all of these devices should provide oxygen and not add other gases. When devices similar to these are used in hospitals, combinations of gases are used, but since in most cases the primary function of artificial respiration is to raise the blood oxygen saturation and lower carbon dioxide tension, first-aid trained personnel should use equipment that feeds only oxygen.

People who use mechanical devices for resuscitation purposes should be thoroughly trained in the operation of that particular machine. The machine should be checked out regularly with the same thoroughness as fire-fighting equipment. The most important aspect of the operation of mechanical devices is the same as in the case of manual methods—the ability to obtain and maintain a clear airway.

Application of mouth-to-mouth or manual methods should be started while waiting for mechanical devices. Promptness is vital.

The pharynx of all asphyxiated persons should be checked frequently to make sure there is no interference as a result of evacuation of stomach contents or accumulation of mucus. * * *

YOU CAN DEPEND ON DAVIS

for effective safety and first aid IN THE FIELD!

DAVIS TOXIC GAS DETECTOR KITS

Detects 37 toxic gases

Model F

Easily operated by non-technical personnel. Model F (illustrated) is for gases that require pyrolysis before analysis. Model NF available for gases that can be analyzed directly. Both kits contain 24 detector tubes, spare parts and manual of operation. Write for Bulletin 1160.

DAVIS HEDGARDS

"Dielectric" cap

"DIELECTRIC" HAT AND CAP — Individually tested; meet E.E.I. specification AP-1 1959.

- **TOUGH:** Will withstand repeated 40 ft. lb. impact tests.
- **SAFE:** Exceeds 20,000 volts in dielectric test.
- **EXTREMELY LIGHT WEIGHT:** No metal parts.
- **MOLDED LUGS** for attaching chin strap.

COLORS: Dielectric Hedgards in standard yellow.
Plastic Hedgards in white, yellow, grey.

MOLDED PLASTIC SNAP-IN SUSPENSION is comfortable and sanitary, adjusts to fit all head sizes. Write for Bulletin 1419.

ALL-PLASTIC HATS. Meet Federal Specification GGG-H-142-b.

DAVIS C-THRU FIRST AID KITS

First aid kit

With window in both kit and carton:

- Save on inspection time.
- Always know whether C-Thru kits are full.
- See contents of each C-Thru Carton.
- Red cellophane zip-off tabs signal that a carton has been opened.

Write for Bulletin 338

SAFETY DAVIS DIVISION

DAVIS EMERGENCY EQUIPMENT CO., INC.
55 Halleck Street, Newark 4, New Jersey
In Canada: Levitt Safety Ltd., 747 Vaughan Road, Toronto

Medical Records

RECORDS are as important in industrial medical service as in any business enterprise. Incomplete or inaccurate records are of little use.

"Paper work" shouldn't be too complicated. A form which will meet the company's needs can be drawn up by the nurse. It may require revision from time to time to add new items or delete others as dictated by experience or changing circumstances.

Data on pre-employment and periodic health examinations should be included in the medical records. Occupational diseases, and advice or treatment for non-disabling ailments should also be recorded.

Records should include:

Medical Records

1. *Personal items* (employment data):
a. Name and address
b. Shop number
c. Age
d. Sex
e. Race
f. Marital status

2. *Plant items* (occupational data):
a. Department
b. Occupation
c. Previous occupation
d. Length of employment

3. *Scientific items:*
a. Date of examination
b. Physical exam classification

When employees returning from absences due to physical reasons are cleared through the medical department, the following additional data are needed:

c. Date of onset of symptoms
d. Date of disability
e. Diagnosis by attending physician
f. Name and address of attending physician

Certification of fitness for work from the attending physician or plant physician may also be required. This may involve physical examination, for which findings should be included in the records.

Accident Records

1. *Personal items:*
a. Name and address
b. Shop number
c. Sex
d. Race
e. Marital status

2. *Plant items:*
a. Department
b. Foreman's name
c. Occupation
d. How long employed
e. Physical exam classification
f. Were guards provided and in place? Could they be used?
g. Cause—mechanical or non-mechanical

3. *Scientific items:*
a. Part of body injured
b. Nature and extent of injury
c. Treatment

4. *Economic items:*
a. Amount of production time lost
b. Amount of wages lost
c. Cost of doctor, drugs and hospital
d. End results

Record cards for various classifications are similar. In some instances, however, items are added to cover special needs. Reference is facilitated if various forms are printed on cards of different color.

An *orange* card would show an employee's pre-employment and periodic check-up examinations and visits to dispensary for treatment of nondisabling complaints, with date, complaint, diagnosis and treatment.

A *blue* card might cover absences from work for nonoccupational physical reasons.

A *yellow* card might cover any occupational disease—disabling or nondisabling.

Paper work is an important part of the nurse's duties. Well-kept dispensary records help both the medical and safety departments.

A *white* card would list all disabling accidental injuries.

With these cards, the employee's file would contain his complete health record, easily analyzed under several important categories.

Such a set of records kept over a year would provide many types of information. For example, by noting the ages of accident cases, the doctor, nurse or safety director could tell whether older or younger workers suffered more injuries.

By running through the cards by department, it is possible to pick the danger spots in the plant and concentrate on them.

Helpful information about types of injuries could be obtained by this method. The number and severity of infections as revealed by the cards might indicate the effectiveness of first-aid methods.

Number of fractures and periods of disability, number of treatments for complete healing of lacerations could be studied. Many other studies could be made and the findings applied.

Names and addresses should always be recorded. In case an employee should be absent the day after treatment, it may be important to learn whether his absence is the result of the injury. A correct address on the record facilitates investigation. * * *

Bike Riders to Get Free Safety Service

Among the nation's 27 million bike riders are many workers and their families. American Bicycle Month in May, sponsored by the bicycle industry, will provide free safety inspections and bike-riding tips for these fans.

Anyone who takes his two-wheeler to a bike repair shop participating in the program will receive a free inspection for his bike. This will include examination of the riding assembly, brakes, and pedals, steering assembly, tires and wheels, and lighting and signaling equipment.

Each bike owner whose equipment passes inspection will receive a stick-on emblem for his bike. Also during May bike sellers will distribute free the 12 official rules of safe riding, plus other riding tips.

SAMARITAN®

RESUSCITATOR / DEMAND INHALATOR / ASPIRATOR

THE FIRST COMPLETE* LOW-COST OXYGEN SUPPLIED RESCUE BREATHER!

* **AN OXYGEN RESUSCITATOR** for asphyxia in cardiac, carbon monoxide, brain damage and other cases where oxygen is required.
* **A MOUTH-TO-MASK RESUSCITATOR** for asphyxia in cases where oxygen is not needed.
* **A BREATHING ASSISTOR** for asthmatics and other persons who have difficulty in breathing.
* **A DEMAND INHALATOR** for breathing patients who have inhaled smoke, solvents or toxic gases.
* **AN ASPIRATOR** for removing vomitus, mucous and fluids from the mouth and upper throat.

All this for the LOW PRICE of

$169.50

(plus $26.75 for Medical "D" Cylinder)

For complete information, see your Globe Distributor or write directly to:
GLOBE, 125 Sunrise Place, Dayton 7, Ohio

GLOBE

Medical and Hospital Div., Globe Industries, Inc.

Employees of Esso Standard Oil demonstrate first aid techniques at exercises of Linden Industrial Mutual Aid Council.

Emergency Organization

Preparedness could prevent much confusion and loss

TO SAVE LIVES and property and to restore normal activity and communications after a disaster, industry needs a program of preparedness. Such a program should not be limited to the individual plant; it requires the participation of all industrial and commercial concerns in the neighborhood, municipal services and the regional civil defense organization.

The purpose of such a plan is to direct workers to safety, rescue trapped persons, give first aid, repair damaged water mains and utility lines, fight fires, and restore normal operation as quickly as possible. No less important, it can allay panic and raise morale.

Emergency organization should not be considered merely as a defense against enemy action. It is even more important for the help it can render in case of man-made or natural disasters, such as fires, explosions, floods, tornados, hurricanes and earthquakes and similar catastrophes.

Civil defense. Contact the local civil defense director, and dovetail plant emergency plans with the available CD setup. Arrangements also should be made with neighboring industrial groups for mutual aid.

Make provisions to lend each other fire-fighting, demolition, and first-aid equipment. Put duplicate lists of equipment at member plants on file in the offices of each plant's security chief. Arrange for an exchange of established emergency services, such as warden, medical, and fire.

The Federal Civil Defense Administration has on hand useful publications that can be slanted to the needs of individual or mutual-aid plans.

Coordinator. Choose a coordinator who has the confidence of management and the work force and who can take complete charge, without divided authority, in an emergency situation. For specialized information he can call on outside consultants, such as representatives of casualty and fire insurance underwriters.

Make a survey of plant buildings and shelter requirements. Any area selected as potential shelter should be in the center of the building, away from outside exposure. "Outside" includes courts and light shafts.

Areas should be in a part of the building that is structurally compact, with close spacing of columns and short-span beams. They should be out of direct line with doors, windows and hallways exposed to the outside. Walls and doors surrounding the area should be free of glass.

Stairways. There should be at least one interior stairway, not adjoining an outer wall. Areas should contain no furnaces, or boilers, and no large steam, water or gas pipes. The ceiling should not be of the hung or suspended type, or have heavy lighting fixtures or plaster ornaments.

The area should be as free as possible of furniture, stored merchandise or equipment of any kind. There should be no safes, banks or filing cabinets or heavy machinery on the floor above.

Hallways, corridors, fire stairs, rest rooms and elevator lobbies in the center of buildings are good locations, if free of glass.

Choose, instruct and assign emergency protection personnel: wardens, police, firemen, engineering and rescue workers. Special training courses may be available in some communities.

Floor plan. Make a floor plan showing branch control rooms, first-aid stations or cabinets, fire extinguishers and other equipment, elevators, stairs, emergency lights and exits, and a general traffic plan.

Put up directional and information signs, including evacuation instructions, in offices and other places where plant personnel meet.

Make arrangements for emergency supplies in shelter locations: first-aid kits, water supplies, and emergency lighting. Be sure that emergency personnel have proper identification — arm bands, hats, special clothing or other gear.

Exit drills. Hold exit drills often, and be certain all employees participate. Announce the first few drills ahead of time, but after routine has been established, hold these drills at irregular intervals without warn-

DON'T LET POISON OAK, IVY, SUMAC STOP YOUR MEN

Specify B···Ys MEDICATED OINTMENT
A PROVED PREVENTATIVE OF THESE POISONINGS

If your men work in the forest, or work in the plant and picnic in the country on weekends . . . let them know about B-Ys MEDICATED OINTMENT. It positively *stops* Poison Oak, Ivy or Sumac.

During the last 7 years, B-Ys Medicated Ointment has been proved by U.S. Forestry Services, Armed Forces and Safety Engineers.

SAFETY ENGINEER IN FORESTS SAYS: "In reviewing the accident record for the past year, we have not had a single case of poison ivy, poison oak or affiliated ailments among our 1100 employees since we started using your Medicated Ointment. After having run an experiment, we standardized the packet type Medicated Ointment and now require that it be in each First Aid Kit."

B-Ys contains no harsh drugs; so mild it can even be used around the eyes. Absorbs into the skin leaving it soft and clean; no mess, no stain. If rash has already manifested itself, B-Ys will quickly relieve itching and dry up rash. Available in easy-to-use polyethylene tubes in ⅝ oz., 1½ oz. and 3 oz.

PARTIAL LIST OF USERS:

U. S. FOREST SERVICE: Alabama, Arkansas, California, Florida, Georgia, Illinois, Louisiana, Mississippi, Missouri, North Carolina, Oregon, South Carolina, Texas, Virginia, Washington, Wisconsin.

POWER COMPANIES: Pacific Gas & Electric, San Francisco; Puget Sound Power & Light, Seattle; Northern States Power, St. Paul; Iowa Electric Light & Power, Cedar Rapids; Oklahoma Gas & Electric, Oklahoma City; Indiana & Michigan Electric, Fort Wayne; Southern Maryland Electric.

TELEPHONE COMPANIES: American Tel & Tel (Western Electric); Telephone Companies: California, Colorado, Illinois, Michigan, Minnesota, Nebraska, Pennsylvania, Washington.

TREE SURGEONS: Davey Tree Surgery; Quaker City Tree Surgery; Wright Tree Service.

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Available thru all Leading Safety Equipment Distributing Houses

FREE SAMPLE for Safety Engineers

B···Ys Inc. 150 HEMLOCK STREET, SAN FRANCISCO

Gentlemen: I am a Safety Engineer. Please send a free ⅝ oz. sample of B-Ys Medicated Ointment to:

Name.....

Address.....

City..... State.....

B···Ys INCORPORATED

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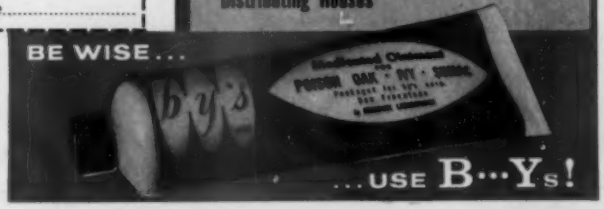


ing. Check for weak points in coordination and communication that can be ironed out in post-mortem sessions after each drill.

The head of each protective service is logically responsible for the training of his workers. In planning a training schedule, he should cooperate with municipal departments and with the local civil defense organization for effective results.

Double training. Where possible, a person trained in one service should be instructed in other services. This versatility might enable a worker trained in rescue techniques, for example, to fight fires.

Teams of protective-services men should be trained to cooperate closely with teams of other protective services. Conditions of training should be as near to actual disaster conditions as possible.

Protective-service teams might engage in training exercises with local civil defense organizations.

Fatigue Is a Set-up For Accidents

WORK ACCIDENTS are reported most often between 10 and 11 a.m. and 3 and 4 p.m. Fatigue is often suspected as a contributing cause.

Physical weariness is not the only factor. There are also psychological and environmental causes, not all of which are related to the job.

When a person is tired, his muscles and brain frequently miss connection. He begins to make too many motions and overlooks details. The result may be an accident.

Overtime is often necessary to meet production schedules, but too much overtime can lower efficiency, increase fatigue, and lower the quantity and quality of output. An overtired worker endangers himself and others.

When much overtime is required, management should take extra precautions. These may involve adjustment of food and medical services, revised rest periods, and renewed emphasis on safe work practices for all shifts.

Rest periods. For monotonous repetitive work, a five-minute break in each working hour is helpful. For less intensive work, a rest period of 10 to 15 minutes in the middle of the first and the last half of each shift is suggested.

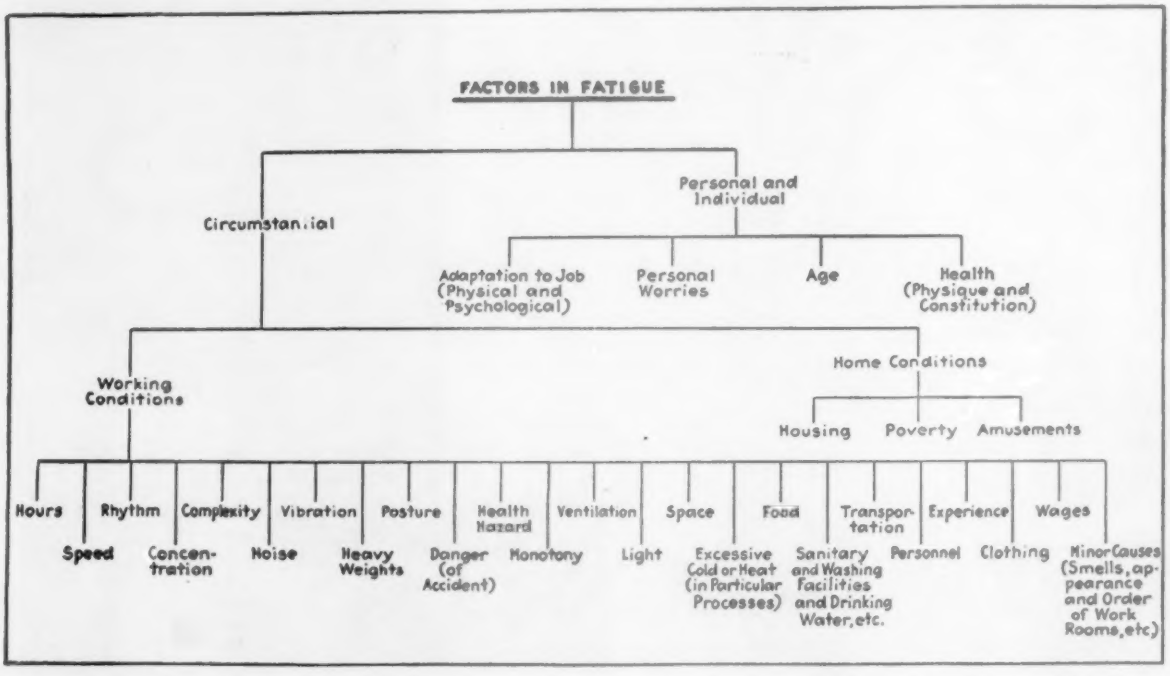
At these breaks, snacks, coffee, milk or soft drinks help to restore energy.

Rotating shifts. When plants operate multiple shifts, an attempt is made usually to rotate workers on day and night shifts, when possible. Some firms prefer to rotate shifts each two or three months, instead of every week or so, since the shorter period doesn't give the individual enough time to adapt himself to changed hours.

Health education. Through educational programs employees can learn essentials of personal hygiene, nutrition, posture, recreation and relaxation.

Environment. Many factors, other than the job itself, affect a worker's resistance to fatigue. For instance, ventilation, lighting, noise, washrooms, drinking water, food service, use of color in the plant, and housekeeping are important.

Placement. Work assignments should match the physical and mental abilities of the individual. Physical capacity can be determined by pre-placement and periodical medical examinations. Mental and emotional traits are hard to nail down, but much can be learned in a pre-placement interview and during the first few days on a job. * * *



Speed saves lives! Rescue workers know that the sooner disaster victims are reached, the better the chances are of saving their lives. The new E & J Lytport II—the result of over thirty years' experience in making emergency equipment—is the ideal unit for dependable, fast-action resuscitation, inhalation and aspiration.

- ***EASY TO CARRY*** . . . only 28½ pounds. Rounded corners, over-size handles, perfect balance.
- ***COMPACT*** . . . only 9½" wide, 10" high, 24" long. Fits easily into car, truck or ambulance.
- ***DEPENDABLE*** . . . pre-set pressures and simple control provide proper aid under any conditions.
- ***NEAT APPEARANCE*** . . . green Fiberglas case is impervious to water, oil, grease and chemical sprays—easy to keep clean.
- ***VERSATILE*** . . . and easy to use. No special skill required. With added hose, aid can be brought to victims at any distance from the unit.

Ask your safety equipment dealer to demonstrate the new E & J Lytport II soon.

E & J . . . FIRST NAME IN RESUSCITATORS

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MAIL TODAY!
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Check below:
☐ Send descriptive folder on the new Lytport II.
☐ I would like a personal demonstration of the Lytport II.

NAME_____
ADDRESS_____
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Snake Bite—Prevention and Cure

AMONG the causes of accidental death in the United States, snake bite is far down on the list. This is due largely to the fact that poisonous snakes are rare in heavily populated areas. Most persons have an instinctive fear of snakes and are likely to be extremely cautious in infested areas.

Industries most subject to the hazard are snake farms and laboratories, where reptiles are handled routinely, and in petroleum, construction, public utilities, and agriculture where they may be encountered unexpectedly.

Snakes are not aggressive; they merely want to be left alone. The danger is in coming up to one unexpectedly. The snake strikes in self defense.

Those who work or take vacation trips in regions where venomous snakes are found should wear protective clothing and study the habits of snakes. Much helpful information will be found in National Safety Council's *Snake Bite Manual.*

Heavy high boots and leggings afford protection against snakes likely to be found in the northern states but heavier garments are needed for defense against some of the tropical and semi-tropical serpents.

Types of Snakes

Venomous snakes in the U. S. fall into four broad categories, three of which are called "pit" vipers because of a pit or indentation between the nostrils and the eyes. In this family are the rattlesnake, the moccasin, and the copperhead.

Their heads are blunt and shaped somewhat like an arrowhead. Venom is injected through two hollow fangs. The size of the snake has little, if any, relationship to the amount or the potency of its venom.

Venom of the pit vipers is quick-acting. Its effect is speeded up by unnecessary activity of the victim. Venom travels to the heart via the lymph system, capillaries, and major blood vessels.

Rattlesnakes are found in every section of the United States and in the Canadian provinces along the border. They have been reported as far north as Sudbury, Ontario, and in southern Alberta.

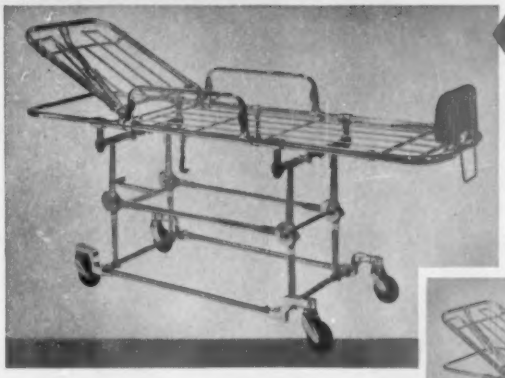
Except for rare types, rattlers seldom become more than 6 ft. long. Their rattles usually give warning before they strike but it isn't safe to count on it.

The cottonmouth moccasin is found in the marshes and swamps of the southern states. When surprised it coils, draws back its head, and opens its mouth wide, showing the white parts of its mouth, hence its name "cottonmouth."

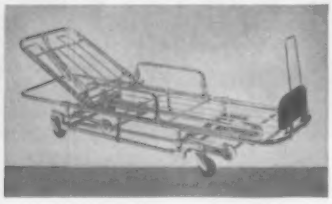
The copperhead is an upland snake. Its habitat is the rock cliffs that border streams of the Appalachian Mountains. It gets its name from the coppery color of the top of its head. It is sluggish and often allows the victim to get within striking distance before it moves.

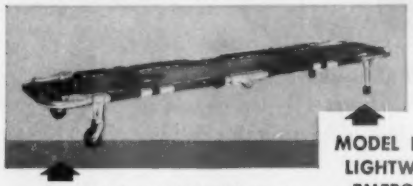
The coral snake resembles the non-poisonous snakes in shape. It is small and colorful. Its seemingly headless body is banded by alternate

ONLY 9½" HIGH—
Washington's LOWEST ELEVATING AMBULANCE COT!



MODEL NO. 54-L
ELEVATING AMBULANCE COT
Here's the perfect answer to cars that have less headroom, and for over-head hanging stretchers. Although this cot folds to only 9½" high, it elevates to 34" hospital-bed height, **instantly and safely!** Famous Washington quality and craftsmanship make it today's finest cot. Reasonably priced at **$143.50.**





Excellent for roadside pickups, removals and various types of patient transfers — a handy extra cot in a hurry! Legs and wheels unfold easily and snap into position, ready for instant use. Weighs only 14 lbs. Price **$44.50.**

MODEL NO. 11
LIGHTWEIGHT
EMERGENCY
STRETCHER

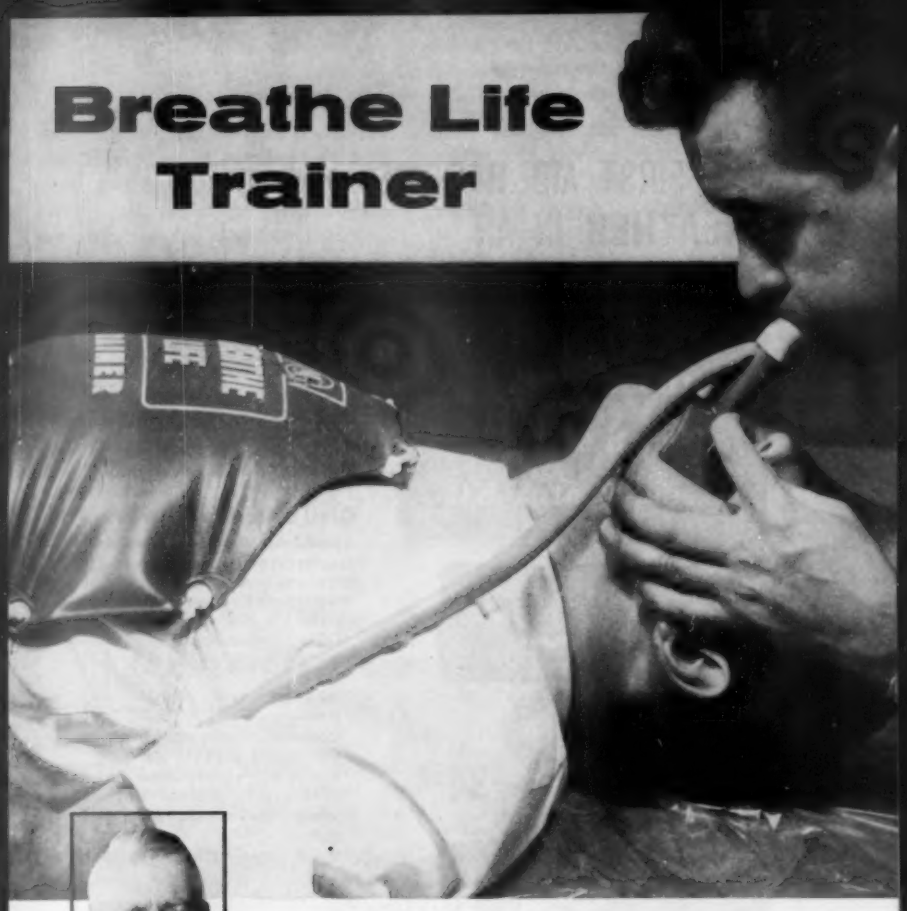
Brings patients down stairs, through hallways and close quarters comfortably, where cots and stretchers cannot be used. Wheels make it easy to maneuver. Folds compactly, stows easily until needed. Complete with pad and two body straps. Price **$47.50.**

MODEL NO. 40
WHEEL MODEL
STAIR CHAIR

See your jobber or write for FREE catalog!

Washington Products Co.
WASHINGTON COURT HOUSE, OHIO

Breathe Life Trainer



"Bridges the gap between theory and practice IN MOUTH-TO-MOUTH ARTIFICIAL RESPIRATION"

"Rescue Breathing" (mouth-to-mouth resuscitation) has been universally accepted as the most effective manual method of artificial respiration.

To perform "Rescue Breathing" correctly, training is a *must* as in any other method of artificial respiration.

Mouth-to-mouth resuscitation cannot be taught correctly without a training aid.

The MSco Breathe Life Trainer is the answer. Films and lectures may tell you "what to do" *but* only the Breathe Life Trainer in the hands of a capable instructor teaches you "how to do" it.

The Breathe Life practice lung on the instructor (victim) enables the student (rescuer) to experience true life conditions likely to be encountered, making a breath-by-breath appraisal of rescue situations, simulated by the instructor (victim).

No actual mouth-to-mouth contact necessary. Absolutely sanitary. No contamination in class demonstration.

Now you can train and become proficient; confident in your ability to perform direct mouth-to-mouth, mouth-to-tube, mouth-to-airway, mouth-to-mask, and mask-to-mask resuscitation correctly.

Order now

MSco Breathe Life Trainer. $9.75 each

MSco Mouthpieces for Trainer, $1.25 (box 50)

Practice "Lung" on instructor's (victim's) chest "Rescue Breather" tube with (expendable) mouthpiece attached. Student (rescuer) is ready to demonstrate. Note: Openings. One allows for instructor normal breath, one for trainee breath into the "lung." No breath or mouth contact.

Blowing breath into "lung." Trainee properly located to hold jaw in "jutting out" position, seal nostrils, watch "lung" response.

Trainee hears exhalation of "victim's" breath, readies to blow another breath into "lung." Practices proper breath force and frequency.

At end of practice, trainee's forefingers drop naturally into position as used in actual mouth-to-mouth emergency. (If instructor (victim) has indicated blocked airway, trainee is taught corrective measures.)

Complete instructions for simulating conditions and "Rescue Breathing Technique" packed with each MSco Breathe Life Trainer.

Medical Supply Company

Rockford, Illinois

Circle Item No. 235—Reader Service Card

THE FIRST AID **RESCUE BREATHER** IN AN ASPHYXIAL EMERGENCY

the Globe M/M Mouth-to-Mask Resuscitator Kit

$34.50

Complete with M/M Resuscitator aspirator, airway and carrying bag. Weighs only 2 lbs.

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Civil Defense Approved!

The Globe M/M Mouth-to-Mask Resuscitator is approved for purchase under the Federal Contributions Program, Office of Civil and Defense Mobilization (OCDM) Standard Item Specification No. CD VIII-177.

* * *

- No objectionable intimate contact
- Operator inhales only fresh air and avoids possible infection
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- Many other **exclusive** features

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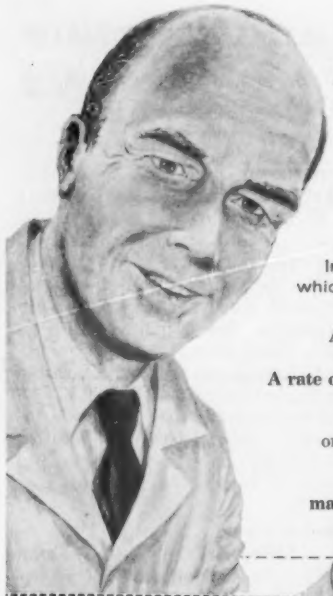
Creators of Specialized Breathing Protection Equipment for industry.



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A rate of flow you set, from 3 to 12 liters per minute, until larger oxygen supplies become available.

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Circle Item No. 217—Reader Service Card

bands of brilliant black and red, separated by narrower bands of yellow.

Like the cobra and the mamba, the coral snake does not have fangs as such. Its teeth are grooved and the venom flows into the wound through the grooves. A bite looks like a semi-circular series of pin-pricks, in contrast to the two fang punctures made by a pit viper.

The quick-acting venom attacks the nerve centers in the brain. The high intensity of the poison accounts for the high mortality rate among victims. Fortunately, bites are comparatively rare.

The coral snake is found in Florida, in the states along the Gulf of Mexico and in the desert areas of the Southwest. It is a burrowing snake of nocturnal habits and is not often seen.

Treatment. Techniques of treating snake bite will be found in many manuals. A snake-bite kit should be carried constantly on the person. Best place is a pouch on a belt. Portable kits on the market contain a lancet, a tourniquet and a suction device, also an antiseptic, adhesive bandage, and ammonia inhalant for treatment of shock.

Antivenin does not belong in a first-aid kit. Its use is not without risk and should be administered only under medical supervision.

Caring for the Injured

—From page 268

body substances and not kill too many body cells at the same time. The choice should be left to the doctor in charge.

Mercury bichloride, for instance, is effective but injurious to tissues. Compounds such as merthiolate, merphenyl, and mercurochrome are devised to get the antiseptic properties of mercury without its toxic effects.

The halogens (tincture of iodine and Dakin's solution) have been widely used because of their strong oxidizing action. They are even stronger than hydrogen peroxide, which is used for the same reason.

Antibiotics. Sulfa compounds, penicillin, terramycin, etc., are not antiseptics, though they are useful in treating many types of infections.

They should be used only under medical supervision.

Transporting the Injured

Where there is any doubt about moving the patient, medical aid should be brought to the scene of the accident, if possible. Lifting a patient into a car may aggravate injuries.

Before the patient is moved he should be treated for possible shock. Fractures should always be splinted.

Stretchers. The army type is easy to handle. It can be used as a cot at the scene of the accident, in transit, and at the first-aid room or hospital. It is frequently stored in a canister in a conspicuously marked spot to keep it clean and ready for use.

Collapsible stretchers may be folded when not in use and carried in an automobile. Some are equipped with wheels and an adjustable head rest.

Bandages, splints, and stretchers may be improvised in emergencies when regular equipment is not available. Improvisation is part of first-aid training. Where men are at work, however, approved equipment and supplies should be kept on hand.

Training. It is often found that accidents are less frequent among persons trained in first aid and it is advisable to have as many employees as possible receive this training.

The American Red Cross first-aid textbook and the U. S. Bureau of Mines manual of first-aid instruction are recommended textbooks.

Announce Award for Accident Research

The Metropolitan Life Insurance Company and the National Safety Council have announced the establishment of the Metropolitan Award to recognize investigators studying the causes of accidents. The purpose of the award, which will be administered by the Council under a grant from Metropolitan, is to encourage research workers in the various sciences to include the problem of accident causation in their studies.

The award, which includes $1,000 and an appropriate testimonial, will be given for the research project in any field of accident prevention judged to be the most significant contribution toward the reduction of accidental injuries and deaths.

Because the field of accident prevention cuts across all scientific areas and is so broad in scope, research may come from any of the disciplines—biological, physical or social. It can also include interdisciplinary undertakings.

To recognize the investigators now studying the causes of accidents and to encourage further research, the 1960 award will be made for research completed within the three-year period of 1957 to 1959.

Rules and information may be obtained by writing John J. Flaherty, director, Research Division, National Safety Council. Projects must be submitted before April 30, 1960.

Minds are like parachutes; they function best when open.

Circle Item No. 218—Reader Service Card

EMERSON Resuscitators

"Simplest and Safest"

SIMPLE to operate.

SAFE for adults, children or infants. Accepted by the American Medical Association on May 30, 1942, for use by trained laymen as well as doctors.

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NOTE: The first few minutes after breathing has ceased are the most critical. Manual artificial respiration should be started immediately and continued until the resuscitator is in use.

For free bulletins, *Medical References on Resuscitation, Emerson Method of Artificial Respiration* and *Emerson Resuscitators for Industry,*

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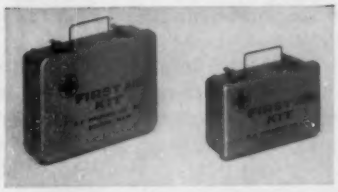

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Write for additional information... or telephone collect to OSborne 5-5200 (Hatboro, Pa.)

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EMERGENCY?

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Strong, comfortable, conveniently-stored REEVES canvas stretchers can be quickly moved to the spot in any emergency. They're ideal for the use of industrial plants, hospitals, first aid and rescue squads, or police departments. The sick or injured may be moved with care, and in many instances, are spared from more serious injury. All REEVES stretchers are equipped with sturdy webbed belts for safety in movement.

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Circle Item No. 223—Reader Service Card

SECTION 12

SAFETY PROMOTION and TRAINING

IN SECTION 12:

Safety Communication 286
Signs of Safety 287
Index 299

COMMUNICATION means getting ideas across to people, improving both their attitudes and their know-how.

Safety communication uses a variety of media and techniques. One of the oldest of these is the bulletin board, and it's still one of the most useful. The employee publication is another effective medium.

Signs, commercial and home-made, are useful for more or less permanent messages carrying warnings or instructions.

Pictures on a screen are invaluable aids in training. Slidefilms and motion pictures—color or black and white, silent or talking—can be rented, purchased, or borrowed from commercial and non-commercial sources.

Even a low-priced camera can produce color slides for projection or black and white pictures for publication and bulletin board use. Photography is a fascinating hobby, too.

Safety Communication

Media for improving skills and attitudes

SAFETY PROGRAM
DuPONT HAS ONE OF THE BEST SAFETY RECORDS IN U.S. INDUSTRY... SAFETY IS ENCOURAGED AND REWARDED AT ALL LEVELS OF WORK... THE SAFEST EQUIPMENT IS STANDARD AT DuPONT PLANTS AND SAFETY AWARDS ARE GIVEN FOR SAFE WORK.
RESULT:
HARD HAT AREA

A flipchart and easel provide a helpful visual aid for meetings out on the job or for more formal meetings in the plant.

AUDIO-VISUAL AIDS have become indispensable in the safety program. By attracting and holding attention they increase the effectiveness of instruction in good work practices, and develop sound attitudes toward accident prevention.

Commonly used media are:

1. Employee manuals
2. Motion pictures and slidefilms
3. Bulletin boards and posters
4. Easels and flipcharts
5. Flannelboards
6. Projectors—overhead and opaque
7. Employee publications
8. Instruction cards

Many effective audio-visual aids are home-made. More elaborate items may be rented or purchased.

Employee Manuals

These booklets tell the employee what the company expects of him, also what he can expect of the company. Safe practices, work rules, group insurance, medical service, personal service facilities, and other details of employment are explained.

Manuals range from simple mimeographed pamphlets to elaborate illustrated books. Cartoons can give a friendly, informal tone to instruction and make rules less forbidding.

Films

Both motion pictures and slidefilms are valuable for training classes and meetings. Types of films include:

1. Strip films projecting individual frames, with the instructor adding the commentary.
2. Sound slidefilms using a similar strip, with disk or tape-recorded commentary.
3. Separate projection slides with either live voice or recordings.
4. Sound and silent movies.

Slidefilms can often be made from photographs taken on the job with amateur equipment. Color adds realism and attention value to slides and movies, but black and white pictures are useful for some subjects which do not lend themselves to color.

Movies require more expensive equipment and greater skill in their production but short amateur movies can often be used effectively.

Most motion pictures, however, will have to be obtained from outside sources. Films on many topics can be rented.

Projection equipment. Projectors for individual slides, slidefilms, and motion pictures, with and without sound equipment, are available in a wide range of prices. Satisfactory equipment can be obtained at a moderate cost.

Overhead projectors can be used in a lighted room. An instructor can draw or write with a grease pencil on a piece of acetate or film positive in front of him. He can point to any important phrase or part of a picture. He faces the audience while the image is projected through a lens onto the screen.

Opaque projectors are similar to the overhead projector, but can be used to reflect and enlarge drawings

—*To page 288*

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Signs of Safety

For warning, direction and instruction

Signs with changeable letters provide a flexible medium for safety messages. (Kaiser Aluminum & Chemical Corp.)

EVERY DAY—at work, in public places and on the highways—we rely on signs for instruction, direction and warning.

Shape, color, wording, and location all help to make signs stand out conspicuously against their surroundings. Recognition of these elements in commanding attention has led to adoption of standards that promote uniformity of design and color.

Some signs, because of their distinctive shape, immediately register their messages. Even illiterate persons can often grasp the meaning at a glance. Examples are the octagonal stop signs at highway intersections and the cross-buck signs at railroad crossings.

Color. According to American Standards Code Z35.1, *Specifications for Industrial Accident Prevention Signs,* characteristic colors for signs should be:

Red—danger.
Yellow—caution.
Green—safety instructions.
Black—directional signs, such as arrows at exits and stairways.

For informational signs any colors except red and yellow may be used.

Commercial signs conforming to specifications of the Code and covering a variety of messages for nearly every industrial situation are available and special signs can be made to order. Enameled metal, the most frequently used material, is resistant to rust and corrosion and is easy to keep clean.

Visibility is particularly important for warning signs. Special illumination may be necessary in poorly lighted areas.

Black and white, and black on yellow, are the most visible combinations. Other combinations are white on black; yellow on white; blue on white; white on blue.

Yellow is the most conspicuous color in daylight; red can be seen most readily by artificial light.

Red is universally accepted to denote danger or fire apparatus. This should always be considered in choosing color combinations for danger signs. Color's force should not be weakened by indiscriminate use.

Color combinations that contrast with surrounding colors should be used so they will stand out clearly. Use only permanent colors.

Fluorescent paints available in a few vivid colors, give increased visibility, particularly in dim light.

Location is important; a warning sign is ineffective if it cannot be seen easily or if it is too far from, or too close to the point of danger.

Wording should be brief, clear, and understandable to persons with limited vocabulary.

Whenever nature of the hazard may not be obvious, the sign should, if possible, specify the danger, such as "Gasoline Storage."

The shorter the wording the better, but many persons resent a brusque order, however impersonal it may be. The best sign will, if it expresses more than a mere stereotyped phrase, like *stop* or *slow,* invite cooperation rather than demand conformity.

Lettering should be as large as possible, consistent with balance and legibility. Block letters generally are preferred for signs.

The weight of line in the body of each letter should be about the same as the space between lines.

Tables of distances at which well-proportioned letters can be read by persons with normal vision under good lighting conditions are given in the American Standards Code Z35.1. This code also offers detailed specifications on construction of standard signs.

Danger signs should not be overworked. They should be restricted to such immediate and serious hazards as high-voltage equipment, toxic and corrosive chemicals, collision hazards, explosives. Employees should be warned of the importance of such signs.

Caution signs warn employees of potential hazards, such as im-

Stock signs in standard design and colors cover most industrial needs. These are often supplemented by homemade signs.

proper use of elevators, cluttered aisles, and sparks from grinding wheels; or against unsafe practices such as oiling machinery in motion, smoking in forbidden areas, and operating machines without guards.

Workers should be trained to respond to caution signs as an indication of potential danger requiring care and alertness. The difference between the *danger* and *caution* signs is one of degree.

Other general types include safety instruction signs, which designate certain actions or practices; directional signs, and information signs.

Reflectorized signs are useful day or night. In darkness they stand out brightly under the beams of a flashlight. They are available in standard designs for warning, direction, and locating emergency equipment.

Maintenance. Periodic inspection and inventory of signs should be part of the safety program. Signs should receive the same cleaning and maintenance that is given to other equipment. Dirty, disfigured signs are not convincing.

Signs no longer needed should be removed. Where hazards have changed, signs more appropriate to present conditions should be substituted.

Warning tags come in a variety of stock subjects. They are attached to equipment in emergencies to warn others that men are working on machines, that a valve on a pipe line has been shut because of a leak, etc. They are also used on unsafe equipment which is to be removed from service.

Decals are miniature signs which can be attached permanently to machines, walls or other places where a message of wraning, caution, or brief instruction is needed. They conform to standard specifications of design and color.

Signboards with changeable letters are available in small sizes suitable for departmental use and larger types which may be erected in conspicuous places near the plant entrance where they can be seen by both employees and the public.

These boards may be used for brief safety messages and for recording the plant's record of no-accident days. * * *

Circle Item No. 224—Reader Service Card

NEW SAFETY FILM SHOWING

MOUTH-TO-MOUTH

Resuscitation

"THAT THEY MAY LIVE"

Running Time — 27 min.

A dramatic 16mm. teaching film produced at the University of Saskatchewan College of Medicine. Shows best method of applying artificial respiration for both industrial and off-the-job accident victims. Practical application in emergency situations and introduction of a group training program are included.

Full color, sound.....$250 each
B & W, sound.....$125.00 each
19 min., full color, sound...$185.00 each

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Communication

—*From page 286*

from books and similar sources. At least one company makes combination overhead and opaque projectors.

Screens are available in a variety of sizes and prices. The size of the meeting room will govern the choice. A beaded screen is more brilliant over a narrower viewing angle and is suitable for general use. A matte screen is better for shorter rooms where the audience is spread out.

Photography

A camera can provide much useful material for the safety program. Slides in color and in black and white add interest to safety meetings and training classes and provide a record of inspections. Enlarged

Famous last words...

Accidents are no laughing matter—stop them before they happen

CAUTION
— DON'T —
CLEAN - OIL - REPAIR
MACHINERY
WHILE IN MOTION

Stonehouse SIGNS
"Signs Since 1863"

Play it safe in your plant with accident-prevention signs. All Stonehouse Signs are made of enduring, tested materials and designed in accordance with American Standard Specifications. MAIL COUPON TODAY FOR FREE, FULL-COLOR, 64-PAGE CATALOG.

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Send me your free 64-page catalog of Safety Signs and Tags.

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Company _____

Address _____

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State _____

prints for bulletin board and employee publication use are low in cost and easy to produce.

Several types of still cameras are available in a wide range of prices. These include:

35 mm. This versatile camera is a favorite with amateurs and is used by many professionals for industrial work in both color and black and white. Slides can be used in standard projectors and good black and white negatives can stand considerable enlargement. Cameras are available with a variety of lens and shutter equipment and accessories in a wide range of prices.

Twin-lens reflex. Negatives on No. 120 or 620 film, 2¼ x 2¼ in., make good enlargements in black and white. Color transparencies are highly effective on the screen but require special projectors.

Press camera. The 4 x 5 in. is the most popular size. Contact prints are

large enough for many purposes. Equipment is rather bulky for amateur use.

One-minute cameras. The Polaroid-Land process produces finished prints one minute after the shutter has been snapped. These are useful when a record is wanted promptly, as in inspections, and extra copies are not needed. Newer high-speed film has increased the usefulness of this camera.

Subminiature. These cameras take negatives from 8 x 11 mm. to 12 x 17 mm. Photographic quality of prints is not equal to larger sizes and they will not stand much enlargement. They are useful where small, inconspicuous equipment is desirable.

Simple cameras with fixed-focus lenses will take excellent pictures under favorable conditions but good industrial pictures usually require a more versatile camera which can be used under difficult lighting conditions.

Accessories. Flash equipment makes the photographer independent of outside light sources. Cameras of most types are available with flash synchronization.

Exposure meters, properly used, are an aid to better pictures, particularly with color film.

Miniature cameras with fast lenses using fast film can take many pictures by available light where a flash might be undesirable.

Bulletin Boards

Bulletin boards in prominent locations are excellent media for

—*To page 298*

Circle Item No. 227—Reader Service Card

DAV-SON offers the biggest selection of

SAFETY-BULLETINS *Free Catalog*

No matter what type of bulletin board you seek—cork, chalk, changeable letter—wood, metal, glass front, lighted—you'll find it in the big NEW Dav-son Catalog. Get yours.

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CORK BACK BULLETIN BOARD
For Inside or Outdoor Use
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We are manufacturers of bulletin boards for every purpose. Changeable letter directories, production control and sales bulletin boards, organizational charts, cork back boards, and special display boards of all types.
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"The Safety Director"
Flashing Color, Changeable Letter Display for Timely Safety Messages. The most effective safety bulletin made. Write for special circular.

METAL SAFETY SIGNS
Hundreds of stock items — danger, caution, directional

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"HOW TO DO RESCUE BREATHING"
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Leading resuscitation experts help you train your people easily and quickly to do this newly adopted, more effective method. Write us for a new print, which you may review and purchase, or return after five days. (16mm, black and white—5 min.—$49.50)
SEMINAR FILMS, INC.
480 Lexington Ave., New York 17

KEEPING

POSTED!

Watch this space each month for late news on NSC services. Use the handy Order Form to request sample copies of publications listed in this issue or to order safety merchandise.

MARCH 1960

NOW . . . FOREMEN STUDY SAFETY AT HOME

First Study-By-Mail Course in Safety . . . offered by The National Safety Council

Utilizing a teaching technique long expounded by specialized schools and popularized by the Armed Forces in World War II, industry is now employing study-by-mail plans to further employee education. Always hard pressed to justify the heavy cost of pulling men off productive jobs for class room study, industry is taking to home study courses as an effective means of developing supervisory skills.

The National Safety Council now offers to industry a home study program in industrial safety for foremen. The course gives a new dimension to safety training. It covers all the fundamentals of accident prevention and deals with the safety responsibilities of supervisors.

A project of the Safety Training Committee of the Industrial Conference, the course was prepared by the Council's staff engineers and pre-tested by 200 foremen in all types of industry before being made generally available.

Each foreman-student is assigned to a staff engineer, who grades the student's papers (usually multiple-choice, true-false type quizzes) and returns them with appropriate comments. In most cases, the Council found, students started-up a running correspondence with their assigned instructor (whose name is given them) often to argue points of view on prescribed safety procedures. Student-instructor communication is encouraged as it serves to keep interest high, and has on several occasions, resulted in changes being made in both the text and the questions asked.

To-date, the course gives indication that safety can effectively be taught from a book and away from the job site. Industry can now take a proven teaching method, reshaped to fit today's needs, and use it to educate and instruct supervisory employees in the very vital subject of safety.

With all studying done at home, the learn-by-mail teaching method doesn't cut into costly work time. It is ideally suited for all foremen because regardless of the extent of their formal education, it permits them to take their time and set their own pace of study.

Enrollment is now open to all. The fee is $30.00 per man (less 10% discount for NSC members) and includes the course text, "Supervisors Safety Manual," examination papers and other course material. Upon completion of the course, all foremen who qualify receive a certificate indicating successful achievement.

Enroll your foremen for this important safety course now! Use the order form on the fold-in page in the "Keeping Posted" section, attaching list of enrollees as instructed. Course materials will be sent to foreman's home address if desired.

Foreman's Home Study Course "Supervising for Safety" (197.01)..$30.00

NATIONAL SAFETY COUNCIL 425 N. MICHIGAN AVE., CHICAGO 11, ILL.

POSTERS

Before using HAND TOOLS
SELECT ...right for the job
INSPECT ...for defects
REJECT ...if in poor condition
©NATIONAL SAFETY COUNCIL

1826-A 8½" x 11½"

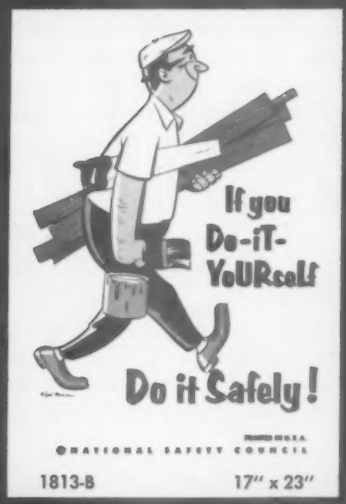
1623-A 8½" x 11½"

1830-A 8½" x 11½"

1839-A 8½" x 11½"

LIFT TRUCK HINTS
Don't disconnect a ramp with load in front
Avoid sudden stops
Stay clear of dock edge
Keep hands away from the uprights
©NATIONAL SAFETY COUNCIL

1831-B 17" x 23"



1813-B 17" x 23"

Sammy Safety Says...

Keep your SAFETY PROGRAM UP TO DATE!

Use this convenient order form to purchase or obtain free NATIONAL SAFETY COUNCIL **SAFETY MATERIALS**

ORDERING INFORMATION

"KEEPING POSTED" MATERIALS

A home study course in safety for foremen. Text book and all course materials furnished. List enrollees by name and give home address if material is to be sent to their home.

POSTERS

Order posters by stock numbers shown below. The last letter in the stock number denotes poster size: "A" 8½"x 11½"; "B" 17"x23"; "C" 25"x38".

A "T" in front of the stock number denotes Traffic poster; a "V" denotes Commercial Vehicle poster. Posters with no letter preceding stock number are industrial.

BOOKLETS

To order booklets: check appropriate box below and write the number of copies of each booklet desired beside the stock number. Any number of copies can be ordered over the minimum (first number in price schedule indicates minimum). *To receive sample copies*: check appropriate box below and then circle stock number of booklets desired.

DASH CARDS & DASH STICKERS

Dash Stickers sold ONLY in series of 12.

Dash Cards sold as subscription series, (2 per month, 12 months) 48 poster-card sides in all. With metal dash card holder. Indicate if BUS or TRUCK series wanted.

These items included under Federal Supply Service Contract GS-005-25043.

FILL OUT, TEAR OFF AND MAIL

ORDER FORM

NATIONAL SAFETY COUNCIL
425 N. Michigan Ave., Chicago 11, Illinois

"SUPERVISING FOR SAFETY"

Foreman's Home Study Course (197.01)

_____ ENROLLMENT LIST ATTACHED

_____ SEND ADDITIONAL INFORMATION

SAFETY POSTERS

List Quantity Desired

STOCK No.	QUANTITY
1615-A	
1623-A	
1682-A	
1813-B	
1826-A	
1830-A	
1831-B	
1839-A	
1860-B	
1861-A	
T 1849-A	
T 1848-C	
T 1850-B	
V 1835-B	
V 1837-B	
V 1838-B	

SAFETY BOOKLETS

☐ Ship Booklets in Quantities Indicated

☐ Send free sample as circled

STOCK No.	QUANTITY
195.70	
294.09	
195.50	
599.82	
195.81	
192.96	
194.22	

Circle Stock Number ONLY for Free Sample

DASH CARDS & DASH STICKERS

Stickers 262.60 (Series of 12)

_____ No. of Sets Wanted

Cards (262.01)

Subscription of 24 Cards, w/dash holder

_____ No. of Subscriptions Wanted

CHECK TYPE OF SERIES WANTED

BUS ☐ TRUCK ☐

NATIONAL SAFETY COUNCIL MEMBERS ENTITLED TO 10% DISCOUNT

SHIP TO

Organization_____

Address_____ City_____ Zone____ State_____

To Attention of:_____

Keep Your Drivers Alert to Safety

...with NATIONAL SAFETY COUNCIL

DASH CARDS and STICKERS

Mini-Sized, In-the-Vehicle Safety Posters Keep Drivers Reminded of Safety While at the Wheel!

A continual program for driver safety. With DASH CARDS and STICKERS, a safety message reaches the driver where and when it counts . . . while he's in the vehicle, on the road and driving. Bright, multi-colored Dash Stickers and Dash Cards constantly work at the job of keeping your driver safety conscious. Frequently changed messages never grow stale. Each message is an important safety tip that pleads for driver caution. Both Cards and Stickers tie-in with your over-all safety program. Their brief, to-the-point safety messages hammer home the importance of safe vehicle operation. The point gets across to the driver (or drivers) dozens of times each day. The Dash Cards are available in two pertinent series; one for buses . . . one for trucks. The Dash Stickers are appropriate for truck, bus and passenger car drivers. The Dash Sticker and Card program of safety has proven highly effective. Whether you operate a single driver operated vehicle, or hundreds, this driver attuned safety campaign is well worth the cost. Without question, Dash Stickers and Dash Cards afford the most effective and least expensive method you can employ to keep your drivers safety minded.

DASH STICKERS — Miniature posters printed in 4-colors with pressure-sensitive backing that adheres to any type of material or surface. Sticks easily, firmly. Requires no water or glue. Peels-off without fuss or tell-tale placement marks. Sold only in sets of 12. A new safety message for every month. Suitable for bus, truck or passenger car operator. Dash Stickers are an integral part of any safety program. Easy to use, the Dash Stickers have proven highly effective, yet economical. Order today.

DASH CARDS — A new safety message every week for 48 weeks. A Dash Card subscription provides 24 beautifully illustrated 3" x 6" cards with an eye-catching safety message printed on both sides. Cards are held in metal card holder that fastens easily to the dash. Holder is provided with each subscription. Dash Cards have proven a tremendous aid in keeping drivers safety minded, accident free. Sold only as a subscription series of 24 cards, (12 issues, 2 per month). Specify whether bus or truck driver directed series is desired. And don't forget your driver salesman's cars when ordering.

GREEN CROSS FOR SAFETY

NATIONAL SAFETY COUNCIL
425 N. MICHIGAN AVENUE, CHICAGO 11, ILLINOIS

PRICE SCHEDULE

DASH STICKERS

STOCK No. 262.60 — Set of 12, per set: 1—$1.30; 2—$.95; 10—$.75; 100—$.66; 1000—$.60.

DASH CARDS

STOCK No. 262.01 — Set of 24 (two per month) with holder, per set: 1—$.87; 10—$.74; 100—$.55; 1000—$.50.

Prices shown subject to a discount of 10% to National Safety Council Members.

U. S. GOVERNMENT AGENCIES NOTE: This item included under Federal Supply Service Contract GS-005-25043.

USE CONVENIENT ORDER FORM ON FOLD-IN PAGE TO ORDER YOUR DASH CARDS AND STICKERS NOW!

©NATIONAL SAFETY COUNCIL

1860-B 17" x 23"

©NATIONAL SAFETY COUNCIL

1615-A 8½" x 11½"

©NATIONAL SAFETY COUNCIL

1861-A 8½" x 11½"

©NATIONAL SAFETY COUNCIL

V1837-B 17" x 23"

©NATIONAL SAFETY COUNCIL

V1835-B 17" x 23"

©NATIONAL SAFETY COUNCIL

V1838-B 17" x 23"

©NATIONAL SAFETY COUNCIL

1682-A 8½" x 11½"

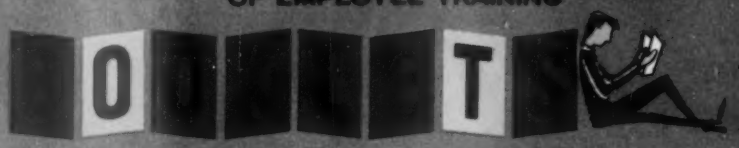
©NATIONAL SAFETY COUNCIL

T1850-B 17" x 23"

©NATIONAL SAFETY COUNCIL

T1848-C 25" x 38"
T1849-A 8½" x 11½"

SEND FOR **FREE SAMPLE COPIES**
OF EMPLOYEE TRAINING



Employee education booklets are a basic part of your safety program. The National Safety Council publishes a wide variety of such booklets designed to shape sound safety attitudes or instruct your employees in the safe practices related to their work or off-the-job activities. Several recent booklets are described below. Sample copies of these booklets may be obtained by circling the code number on the order form or they can be ordered in quantity for prices shown.

YOUR FUTURE — KEEP IT CLEAN

A booklet dealing with the problem of housekeeping in the plant. Colorful cartoons with breezy captions build a strong case for good housekeeping. Eight pages, 3½" x 6¼". Full color illustrations.

STOCK NO. 195.79—Cost per booklet: 50—$.052; 500—.047; 1M—.043; 5M—.04; 10M—.038; 20M—.036.

A PROFESSIONAL CODE FOR DEFENSIVE DRIVING

Dedicated to the millions of professional drivers who developed and refined the concept of "defensive driving" as their approach to the hazards of the highway, this booklet presents the defensive driving techniques for all drivers. Twenty pages, 5¼" x 8¼". Multicolored illustrations.

STOCK NO. 294.09—Cost per booklet: 10—$.25; 50—.21; 500—.18; 1M—.16; 5M—.15; 10M—.14.

ACCIDENTS IN THE OFFICE

Brightly colored and presented in an eye-appealing way, this new booklet will help alert your "white collar" staff to the common hazards found in their occupational environment. "Accidents in the Office" fills a long-felt need. Eight pages, 3¾" x 8". Two-color illustrations.

STOCK NO. 195.50—Cost per booklet: 50—$.06; 500—.05; 1M—.045; 5M—.043; 10M—.042; 20M—.04.

BEFORE IT'S TOO LATE

Dedicated to "all brave firemen who try to arrive before it's too late," this booklet tells the tragic story of home fires and how to prevent them. Real-life pictures taken at the time of a fire help dramatize the message. Twelve pages, 3¾" x 8". Two-color photographs and illustrations.

STOCK NO. 599.82—Cost per booklet: 50—$.07; 500—.06; 1M—.052; 5M—.046; 10M—.042; 20M—.04.

FRED FLAME, THE FIERY DELINQUENT

Somewhat humorous in approach, this booklet deals with the deadly serious problem of preventing industrial fires. Written in a simple, direct style, it should drive the message home to your employees. Sixteen pages, 3¾" x 8". Illustrated.

STOCK NO. 195.81—Cost per booklet: 50—$.06; 500—.055; 1M—.05; 5M—.045; 10M—.042; 20M—.04.

WHO GETS HURT?

"Who Gets Hurt in Industrial Accidents?" is the question asked—and answered by this new, multicolored cartoon booklet. Using a humorous approach, this booklet tells the complete on-the-job injury story in a concise manner. Sixteen pages, 3¾" x 8". Full-color illustrations.

STOCK NO. 192.96—Cost per booklet: 50—$.10; 500—.09; 1M—.08; 5M—.07; 10M—.065; 20M—.055.

A SIMPLE DO-IT-YOURSELF PROJECT

The safety of a worker's fingers—industry's best production tools—is the subject of this booklet. Cartoons and brief copy help remind workers of the do's and dont's of hand safety. Eight pages 3¾" x 8". Two-color illustrations.

STOCK NO. 194.22—Cost per booklet: 50—$.057; 500—.048; 1M—.041; 5M—.033; 10M—.031; 20M—.029.

Use the handy Order Form to request free sample copies or to order booklets in quantity lots. For listing of additional booklets available, write—

GREEN CROSS FOR SAFETY

NATIONAL SAFETY COUNCIL
425 N. MICHIGAN AVENUE, CHICAGO 11, ILLINOIS

Keep Your Drivers Alert to Safety

...with NATIONAL SAFETY COUNCIL

DASH CARDS and STICKERS

Mini-Sized, In-the-Vehicle Safety Posters Keep Drivers Reminded of Safety While at the Wheel!

A continual program for driver safety. With DASH CARDS and STICKERS, a safety message reaches the driver where and when it counts . . . while he's in the vehicle, on the road and driving. Bright, multi-colored Dash Stickers and Dash Cards constantly work at the job of keeping your driver safety conscious. Frequently changed messages never grow stale. Each message is an important safety tip that pleads for driver caution. Both Cards and Stickers tie-in with your over-all safety program. Their brief, to-the-point safety messages hammer home the importance of safe vehicle operation. The point gets across to the driver (or drivers) dozens of times each day. The Dash Cards are available in two pertinent series; one for buses . . . one for trucks. The Dash Stickers are appropriate for truck, bus and passenger car drivers. The Dash Sticker and Card program of safety has proven highly effective. Whether you operate a single driver operated vehicle, or hundreds, this driver attuned safety campaign is well worth the cost. Without question, Dash Stickers and Dash Cards afford the most effective and least expensive method you can employ to keep your drivers safety minded.

DASH STICKERS — Miniature posters printed in 4-colors with pressure-sensitive backing that adheres to any type of material or surface. Sticks easily, firmly. Requires no water or glue. Peels-off without fuss or tell-tale placement marks. Sold only in sets of 12. A new safety message for every month. Suitable for bus, truck or passenger car operator. Dash Stickers are an integral part of any safety program. Easy to use, the Dash Stickers have proven highly effective, yet economical. Order today.

DASH CARDS — A new safety message every week for 48 weeks. A Dash Card subscription provides 24 beautifully illustrated 3" x 6" cards with an eye-catching safety message printed on both sides. Cards are held in metal card holder that fastens easily to the dash. Holder is provided with each subscription. Dash Cards have proven a tremendous aid in keeping drivers safety minded, accident free. Sold only as a subscription series of 24 cards, (12 issues, 2 per month). Specify whether bus or truck driver directed series is desired. And don't forget your driver salesman's cars when ordering.

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Prices shown subject to a discount of 10% to National Safety Council Members.

U. S. GOVERNMENT AGENCIES NOTE: This item included under Federal Supply Service Contract GS-00S-25043.

USE CONVENIENT ORDER FORM ON FOLD-IN PAGE TO ORDER YOUR DASH CARDS AND STICKERS NOW!

They call it a Grass House—this Hydroponic Unit where green feed for cattle grows the whole year 'round

THIS "HOT LINE" CREW SEES THAT THE "SUNSHINE STAYS ON"

Wausau Story

by **H. H. Shattuck,** *Manager*
Coast Electric Power Association, Bay St. Louis, Mississippi

"In cities and on farms, electric service is so reliable that you might never give a thought to the men who keep the power flowing without interruption.

"However, the men are aware of what their jobs mean to you. I know the crews at Coast Electric take pride in providing the power that serves so many purposes. Besides lighting our homes and running appliances, new applications are being added all the time.

"The Grass House is an example. This 12 by 20 foot building houses a Hydroponic Green Feeds Unit. In the picture above, E. M. Brignac, Jr. (right) shows me how oats is grown in metal trays, using water and chemicals instead of soil. About 1000 pounds of green feed for the Brignac herd is produced this way every day. Electricity provides the 'sunshine', the light needed for growth. Electricity controls ventilation and maintains the ideal temperature.

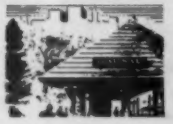
"As safety engineers will tell you, the interest our crews take in their work is a part of what keeps men from having accidents on the job. Safety is a matter of attitude as well as awareness—training, too, *and* teamwork.

"When it comes to teamwork, we're fortunate in having Employers Mutuals people working with us. They have years of experience in serving hundreds of power companies from coast to coast. With their help, we've built a record that spans over 5 years and adds up to more than 500,000 man-hours without a single lost-time accident. We say Employers Mutuals are 'good people to do business with'!"

500,000 man-hours... more than 5 years without a lost-time accident. This record is significant when you realize that "hot line" crews deal with 12,000 volts of electricity, maintain service 24 hours a day in all kinds of weather. Here Mr. Shattuck adds the gold plaque to the safety trophy awarded by Employers Mutuals of Wausau.

Employers Mutuals of Wausau has offices all across the country. We write all forms of fire, group and casualty insurance (including automobile). We are one of the largest in the field of workmen's compensation. Consult your telephone directory for the nearest Wausau Man or write us in Wausau, Wisconsin.

Employers Mutuals *of* Wausau



"Good people to do business with"

Circle Item No. 230—Reader Service Card

Fire Prevention Signs

STOP FIRES BEFORE THEY START

Complete line includes approved signs for every purpose, indoors or outdoors. Two gauges of steel available, with baked enamel or porcelain enamel finish. Send today for catalog and prices.

STANDARD SIGNS
INCORPORATED
3190 EAST 65th STREET
CLEVELAND 27, OHIO

FREE

SAFETY PROMOTION KIT

Includes:

- **Training Outline "How to Prevent Accidents"**
- **Four Step "Hazard-Spot" Card**
- **Accident Prevention Displays (17" x 22" Multi-color)**
- **50 Page Planning Guide**

This valuable kit is yours without obligation. Simply fill out the coupon and mail it today.

ELLIOTT SERVICE COMPANY, INC.
Mount Vernon, New York

ELLIOTT SERVICE COMPANY, INC.
Dept. IS, Mount Vernon, N. Y.

Please provide me with the Elliott "Safety Promotion Kit."

Name_____
Title_____
Firm_____
Address_____
City_____ Zone____ State_____

Communication

—From page 290

official announcement and news as well as for safety information and reminders in the form of posters, charts, photographs, and exhibits of protective equipment.

In companies without employee publications bulletin boards serve some of the functions of a newspaper.

Unimaginative or unsystematic use of boards impairs their effectiveness. Here are a few suggestions for enlivening displays.

1. Locate them where they will be seen (cafeterias, recreation rooms, elevator entrances, locker rooms, near time clocks or drinking fountains).
2. Change copy frequently—as often as every two days. Fresh displays attract more attention.
3. Keep copy brief. If possible, use less than 100 words for notices and news items.
4. Use large type, art, and color. Cartoons are especially popular.
5. Keep as near eye level as possible—about 63 in. from the floor.
6. Provide good illumination. Flashing lights attract attention and are sometimes used in nonproducing areas. They may be a distraction in work places.
7. Glass covers protect displays from dirt and defacement and prevent posting of unauthorized material.
8. Don't fill up boards too solidly with printed matter. Liven them up; don't overdo dignity.

Posters are visible evidences of a safety program. Unfortunately, some companies have depended on posters to carry the load and neglected such essential activities as guarding housekeeping and job instruction. If posters are not backed by sincere effort to improve working conditions, employees will have little respect for the safety program.

The value of posters is emphasized by the efforts of advertisers to acquire billboard space near factory gates. These locations are frequently used for large safety signboards where both employees and the public can get the message. Outdoor boards are made more effective by floodlighting.

A convenient size for a bulletin board is 22 in. wide by 30 in. high. Boards should be attractively painted and glass covered. Green, traditional safety color, is commonly used but other colors can be used effectively. One board in a workroom is usually sufficient but in lunch rooms or locker rooms several panels may be used effectively.

Displays need not be limited to safety posters. Any subject of interest to employees and management may be used on the boards. In fact, safety posters may have a stronger appeal if displays include other subjects.

One poster alone doesn't do the job. It takes the continual impact of the program. Different posters will appeal to different persons and to different moods in the same person.

Sometimes a special display may be used to launch a campaign on a theme, such as eye protection or safety shoes.

Notices may inform employees about matters of local interest, such as comparative safety records and contests and reports of accidents and near-accidents.

Displays of broken goggles and damaged safety shoes and hard hats can be interesting and convincing when accompanied by stories and pictures of the workers involved. But object lessons can become monotonous and it takes ingenuity to find fresh ways of presenting familiar subjects.

Posters, if carefully handled, can be rotated to three boards. They should be discarded when showing signs of wear. Displays should maintain standards expected of advertisements of the company's products.

Posters bring eye-arresting splashes of color and safety messages to the bulletin board. Often poster displays will catch the new employee's eye on the way to his department. These graphic displays will inform, remind, and often amuse. An occasional light touch has been found effective in getting across serious thoughts.

Jumbo posters, 8½ x 11 ft., are often placed on boards in conspicuous locations where the employee cannot fail to see them when coming to work or leaving the plant. If they can be seen by the public passing the plant, they will also

help to make a favorable impression.

Jumbo posters may be obtained from the National Safety Council on a monthly service basis. Billboards may be decorated with original art work, perhaps including a scoreboard for the plant's record of accident-free days.

Easels and Flipcharts

Easels and flipcharts are helpful in conducting meetings. Examples of this type of material are the National Safety Council's *Safetygraphs*, each dealing with a specific topic. They are designed for use by foremen and others in holding meetings with small groups.

Safetygraphs consist of drawings, cartoons, charts, and other illustrations printed on heavy paper and spiral-bound which fits into a folder that opens to form an easel. With the large illustration facing the audience, the instructor discusses the subject, using his own words or reading the suggested talk on the back of the illustration.

Flannelboards can be used effectively to present outline of talks and illustrative material.

Safety Instruction Cards

Cards 3 x 5 in. covering safe methods for practically every type of industrial operation, as well as seasonal and off-the-job subjects, are issued to employees as part of their job instruction. Often they are placed near the bench or machine to serve as reminders.

While the messages on most instruction cards are rather long to serve as posters, some companies make enlarged photostats of the cards and mount them on bulletin boards.

Employee Publications

Employee publications furnish an excellent medium for safety communications. These publications range from simple mimeographed bulletins to elaborately printed and illustrated magazines. Illustrated safety stories are regular features in many publications.

Most publications carry news of employee and company activities but some are strictly safety bulletins for employees, supervisors, and special groups. * * *

Circle Item No. 232—Reader Service Card

SPANISH Versions

of a selected group of widely used "Safety" Films as listed in the National Safety Film Directory

(Available 16mm, sound, black-and-white)

"ACCIDENTS DON'T HAPPEN" Film Series

#1—**ORGANIZATION**—11 min. *(Organizacion)*
#2—**MACHINES**—8 min. *(Maquinas)*
#3—**HANDLING**—5 min. *(Manejo)*
#4—**FALLS**—6 min. *(Caidas)*
#5—**SAFE CLOTHING**—10 min. *(Vestuario)*
#6—**SAFETY SUPERVISOR**—11 min. *(El Supervisor De Seguridad)*
#7—**EARLY HANDLING OF SPINAL INJURIES**—18 min. *(Lesiones En El Espinazo)*

FIRE, TRAFFIC, HEALTH and INDUSTRIAL SAFETY Films

#1—**HOW TO AVOID MUSCLE STRAINS**—15 min. *(Como Evitar La Lesion Muscular)*
#2—**CAUSE FOR ALARM**—11 min. *(Motivo de Alarma)*
#3—**FOR SAFETY'S SAKE**—15 min. *(Seguridad Ante Todo)*
#4—**FATAL SECONDS**—10 min. *(Segundos Fatales)*
#5—**TIME TO STOP**—20 min. *(El Momento de Frenar)*
#6—**DAY IN COURT**—25 min. *(Un Dia En El Tribunal)*
#7—**IGNITION & SPARK PLUGS**—17 min. *(El Encendido Y Las Bujias)*

#8—**OPERATION SURVIVAL**—17 min. *(Operation Supervivencia)*

—For your plants and operations in Spanish-speaking areas, these films will save needless loss of man-hours and production delays—

—WRITE FOR FURTHER INFORMATION AND PRICES—

BRAY STUDIOS, INC. | 729 SEVENTH AVENUE NEW YORK 19, N. Y.

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16mm sound
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SECTION 13

PRODUCT and SOURCE DIRECTORIES

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When a safety man needs immediate information about a particular product and where he can get it fast, the directories of the Annual Safety Equipment issue provide the answer. The Product Index includes over 600 safety products. The address, branch offices, distributors or representatives of each company listed under a product heading may be found in the Directory of Safety Equipment Sources. This year, for the first time, there is a section (No. 10) on radiation safety products.

Again this year, the Product Index is subdivided into 12 groups—the same 12 groups that comprise the editorial-advertising sections. For example, products relating to the material found in Section 9, Plant Protection, will be found in Section 9 of the Classified Safety Product Index.

Full product descriptions may be found in advertisements of many of the companies listed in the Sources Directory. Advertising page numbers may be found in the Directory of Safety Equipment Sources and the Advertisers' Index.

directory of safety equipment sources

—A—

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Fred C. Kramer Co., 128 S. Paulina St., Chicago, Ill.
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Reynolds Aluminum Supply Co., Fern Valley Rd. near Grade Lane, Louisville, Ky.
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Dixie Bearings, Inc., 215 S. Floyd St., Louisville 2, Ky.
Central Mine & Supply Co., 276 W. Center St., Madisonville, Ky.
Kentucky Bearings Service, Inc., 710 E. 4th St., Owensboro, Ky.
Petter, Henry A., Supply Co., 117 S. 1st St., Paducah, Ky.
Dixie Bearings, Inc., 2305 Weller Ave., Baton Rouge 9, La.
Behring Bearings Service of La. Inc., 915 Third Ave., Lake Charles, La.
Pelican Supply Co., Inc., Cities Service Rd., Box 1400, Lake Charles, La.
Dixie Bearings, Inc., 401 Howard Ave., New Orleans 13, La.
Tricon, R. J., Co., 747-755 Tchoupitoulas St., New Orleans 12, La.
Hollis & Co., 251 Montgomery St., Box 149, Shreveport 82, La.
Peerless Supply Co., Inc., 701 Spring St., Box 36, Shreveport 36, La.
Pelican Supply Co., Inc., 901 McNeil St., Shreveport 84, La.
Leen, Stanley J., Co., 54 Wilson St., Brewer, Maine
Bearings Specialty Co. of Portland, 18 Bedford St., Portland, Ore.
Leen, Stanley J., Co., 35 Union St., Portland 3, Maine
Bearings, Inc., 1901 Howard St., Baltimore 18, Md.
Zies, Charles, & Sons Co., 314 S. Fremont Ave., Baltimore 30, Md.
Bearings Specialty Co., 665 Beacon St., Boston 15, Mass.
Machinery Sales Corp., Elm, Water & Bethel Sts., Box 367, New Bedford, Mass.
Bearing Distributors, 327 Penn St., Pittsfield, Mass.
Berkshire Mill Supply Co., 47 Clapp Ave., Pittsfield, Mass.

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directory of safety equipment sources

Foss, W. J., Co., 112-116 Broadway, Springfield 3, Mass.
Brierly, Lombard & Co., Inc., 107-9 Foster St., Worcester 8, Mass.
Royall, Inc., 4705 Washtenaw Rd., Box 623, Ann Arbor, Mich.
Detroit Ball Bearing Co. of Michigan, Battle Creek, Michigan
Flood Supply Co., Crystal Falls, Mich.
Carlson-Dimond & Wright, Inc., 14221 E. Eight Mile Rd., Warren, Mich.
Detroit Ball Bearing Co. of Mich., 110 W. Alexandrine Ave., Detroit 1, Mich.
Detroit Ball Bearing Co. of Mich., 25345 Plymouth Rd., Detroit 39, Mich.
Detroit Ball Bearing Co. of Mich., 3501 N. Saginaw St., Flint 5, Mich.
Gransden-Hall & Co., Walnut & Poplar Sts., Flint 1, Mich.
Detroit Ball Bearing Co. of Mich., 48-50 W. Fulton St., Grand Rapids 2, Mich.
Detroit Ball Bearing Co. of Mich., 1005 E. Michigan Ave., Jackson, Mich.
Detroit Ball Bearing Co. of Mich., 424 Harrison St., Kalamazoo, Mich.
Detroit Ball Bearing Co. of Mich., 425 E. Michigan Ave., Lansing 29, Mich.
Detroit Ball Bearing Co. of Mich., 162 Apple St., Muskegon, Mich.
Lakeshore Machinery & Supply Co., 480 W. Laketon Ave., Muskegon, Mich.
Detroit Ball Bearing Co. of Mich., 461 S. Saginaw St., Pontiac 19, Mich.
Detroit Ball Bearing Co. of Mich., 425 N. Washington Ave., Saginaw 2, Mich.
Gransden-Hall & Co., 2011 S. Michigan, Saginaw, Mich.
Detroit Ball Bearing Co. of Mich., 21019 Mound Rd., Box 136, Van Dyke, Mich.
Arrowhead Bearing Co., Inc., 1015 E. Superior St., Duluth 2, Minn.
Arrowhead Bearing Co., East Highway 169, Hibbing, Minn.
Arrowhead Bearing Inc., 1529 Hennepin Ave. S., Minneapolis 3, Minn.
Industrial Supply Co., Inc., 1100 Third Ave. S., Minneapolis 4, Minn.
Gopher Bearing Co., 856 Raymond Ave., St. Paul 14, Minn.
Harper Foundry & Machine Co., 105 E. Rankin St., Jackson 5, Miss.
Mississippi Bearings, Inc., 843 S. State St., Jackson, Miss.
Peerless Supply Co., Inc., 200 State St., Natchez, Miss.
Scott Supply Co., Inc., Fifth at Wall St., Joplin, Mo.
Bearing Distributors, Inc., 1919 Baltimore Ave., Kansas City 10, Mo.
Webb Belting & Supply Co., 1501 W. 12th St., Kansas City 1, Mo.
Briner Electric Co., 1007-1015 Delmar Blvd., St. Louis 1, Mo.
Neiman Bearing Co., 2727 Washington Ave., St. Louis 3, Mo.
Te-Co, Inc., 501 N. 2nd St., St. Louis, Mo.
Bearings Supply Co., 1123-23rd Ave. N., Billings, Mont.
Weissman, Carl, & Sons, 218 Fourth St. S., P. O. Box 1204, Great Falls, Mont.
Montana Mercantile Co. 1600 Harker Ave., Missoula, Mont.
Acme Bearing Service, Inc., 2509 Dodge St., Omaha 2, Neb.
McShane, T. S., Co., Inc., 1113-15 Howard St., Omaha 2, Neb.
Sierra Industrial Co. Inc., 307 Morrill Ave., P. O. Box 1330, Reno, Nev.
Perkins, Bassett & Wright, Inc., 391 West St., Keene, N. H.
Bearings, Inc., 1035 Wright Ave., Camden 3, N. J.
Bobker Bearings, 132-134 Getty Ave., Clifton, N. J.
Bobker Bearings, 515 Raritan Ave., Highland Park, N. J.
Bobker Bearings, 3239 Hudson Blvd., Jersey City 6, N. J.
Bobker Bearings, 248 Central Ave., Newark 4, N. J.
Mathewson, Geo. A., Co., 415 Raymond Blvd., Newark 5, N. J.
Wiley-Hughes Supply Co., Inc., Spruce St., Corner New York Ave., Trenton 8, N. J.
Trenton Bearings Co., 1812 N. Olden Ave., Trenton 8, N. J.
Mine Supply Co., 314 Industrial Ave. N.E., Albuquerque, New Mexico
Montezuma Bearing Co., 1413 First St., N. W., Albuquerque, N. M.
Vance Supply Co., Farmington, N. M.
Vance Supply Co., 211 S. Grimes St., Hobbs, N. M.
Syracuse Bearing Southern Tier Corp., 5 Jarvis St., Binghamton, N. Y.
Balanrol Corp., 313 Niagara St., Buffalo 1, N. Y.
Webb, J. A., Belting Co., Inc., 92 Pearl St., Buffalo 2, N. Y.
Syracuse Bearing Corp. 2275 Fillmore Ave., Buffalo 14, N. Y.
Syracuse Bearing Corp., 323 E. 14th St., Elmira, N. Y.
Syracuse Bearing Jamestown Corp., 821 E. 2nd St., Jamestown, N. Y.
Jamaica Bearings Co., 138-72 Queens Blvd., Jamaica 35, N. Y.
Hansen & Yorke Co., Inc., 90 Warren St., New York 7, N. Y.
Balanrol Corp. (Sub. of Bearings, Inc.), 3105 Pine Ave., Niagara Falls, N. Y.
Syracuse Bearing Corp., 2903 Pine Ave., Niagara Falls, N. Y.
Cross Brothers Co., Inc., 112-114 Mill St., Rochester 1, N. Y.
Syracuse Bearing Rochester Corp., 159 Comfort St., Rochester, N. Y.
Bearing, T. T., Co., Inc., 454 Court St., Rochester 7, N. Y.
LeValley McLeod, Inc., 126-140 Van Guysling Ave., Schenectady 5, N. Y.
Syracuse Bearing Co., 428 E. Jefferson St., Syracuse, N. Y.
Robert J. Uplinger, Inc., 430 Oneida St., Syracuse, N. Y.
Bearing Distributors, 1 Spring Ave., Troy, N. Y.
Mather, Evans & Diehl Co., Inc., 509 Lafayette St., Utica 2, N. Y.
Syracuse Bearing Utica Corp., 1407 Oriskany St., West, Utica 4, N. Y.
Tidewater Supply Co., Inc., 95 Roberts St., Asheville, N. C.
Dillon Supply Co., 1618 W. Morehead St., Charlotte 8, N. C.
Dixie Bearings, Inc., 1621 N. Tryon St., Charlotte 6, N. C.
Mathews-Morse Sales Co., 301 E. 7th St., Charlotte 1, N. C.
Dillon Supply Co., 112 S. Duke St., Durham, N. C.
Dillon Supply Co., 1635 N. William St., Goldsboro, N. C.
Dixie Bearings, Inc., 231 E. Washington St., Greensboro, N. C.
Odell Mill Supply Co., 300-302 N. Forbis St., Greensboro, N. C.
Tidewater Supply Co., Inc., 1570 Lee St., Greensboro, N. C.
Carolina Rubber & Supply Co., Hwy 17, South, New Bern, N. C.
Dillon Supply Co., 216 S. West St., Raleigh, N. C.
Dillon Supply Co., 348 S. Washington St., Rocky Mount, N. C.
Tidewater Supply Co. Inc., 157 Castle Hayne Road, Wilmington, N. C.
Modern Machine Works, 921 Front St., Bismarck, N. D.
Arrowhead Bearing, Inc., 2010 Main Ave., Fargo, N. D.
Sims Machine Shop, 516 10th Ave., N., Grand Forks, N. D.
Bearings, Inc., 20 Fair St. at Hackett, Akron 11, Ohio
Mahoning Valley Supply Co., 274 Park St., Akron 4, Ohio
Bearings, Inc., 913 Ninth St., S. W., Canton 4, Ohio
Mahoning Valley Supply Co. 2401 Shepler Church Rd., Canton 6, Ohio
Bearings, Inc., 1417 Central Pkwy., Cincinnati 14, Ohio
Bearings, Inc., 105 Mill St., Cincinnati (Lockland) 15, Ohio
Cincinnati Engine & Parts Co., 2863 Stanton Ave., Cincinnati 6, Ohio
Bearings, Inc., 3634 Euclid Ave., Cleveland 15, Ohio
Bearings, Inc., 3065 W. 117th St., Cleveland 11, Ohio
Cleveland Tool & Supply Co., 1427-1437 W. 6th St., Cleveland 13, Ohio
Mahoning Valley Supply Co. of Cleveland, 500 S. Green Rd., Cleveland 21, Ohio
Bearings, Inc., 175 Cleveland Ave., Columbus 15, Ohio
Ohio Transmission Co., 666 Parsons Ave., Columbus 6, Ohio
Bearings, Inc., 608 S. Jefferson St., Dayton 2, Ohio
Transmission, Inc., 1041 S. Patterson Blvd., Dayton 2, Ohio
Bearings, Inc., 608 S. Jefferson St., Dayton 2, Ohio
Bearings, Inc., 591 Cleveland St., Elyria, Ohio
Bearings, Inc., 706 East Ave., Hamilton, Ohio
Bearings, Inc., 142 S. Elizabeth St., Lima, Ohio
Bearings, Inc., 137 W. 6th St., Mansfield, Ohio
Bearings, Inc., No. 4 Woodland, Painesville, Ohio
Bearings, Inc., 1302 Washington St., Toledo 2, Ohio
Detroit Ball Bearing Co. of Ohio, 325-327 10th St., Toledo 2, Ohio
Ohio Belting & Transmission Co., 300 N. Westwood Ave., Toledo 7, Ohio
Bearings, Inc., 2007 South Ave., Youngstown 2 Ohio
Mahoning Valley Supply Co., 704 Youngstown-Poland Rd., Youngstown 14, Ohio
Bearings, Inc., 738 Linden Ave., Zanesville, Ohio
Consolidated Supply Co., P. O. Box 367, Picher, Okla.
Materials Handling, Inc., 4450 E. Admiral Place, Tulsa 15, Okla.
Bearing Supply Co., 894 S. Broadway, Coos Bay, Ore.
Coos Bay Supply Co., 1023 S. Broadway, Coos Bay, Ore.
American Steel & Supply Co., 888 Garfield, Eugene, Ore.
Bearing Supply Co., 234 W. 6th Ave., Eugene, Ore.
Barnett, Fred E., Co., of Ore., 600 Spring St., Klamath Falls, Ore.
American Steel & Supply Medford Inc., 703 S. Grape St., Medford, Ore.
FAM Bearings, Inc., 126 N. Front St., Medford, Ore.
Davis, A. W., Supply Co., Box 676, Pendleton, Ore.
Brezee Supply Co., 237 S. W. Front Ave., Portland 4, Ore.
Power Transmission Products, Div. of Portland Iron Works, 1107 N. W. 14th Ave., Portland, Ore.
Douglas Supply Co., 649 N. E. Rose St., P. O. Box 669, Roseburg 1, Ore.
Bearing Supply Co., 1338 S.E. Stephens, Roseburg, Ore.
Stevens Steel & Equip. Co., Supply Div., 110 Division St., Salem, Ore.
Bearings, Inc., 812 Buffalo Rd., Erie, Pa.
Bearings, Inc., 58 Poplar St., Johnstown, Pa.
A-C Supply Co. of Philadelphia, 1330 Federal St., Philadelphia 47, Pa.
Bearings, Inc., 1607 W. Hunting Park Ave., Philadelphia 40, Pa.
Pruyn Bearings Co., 685 N. Broad St., Philadelphia 23, Pa.
Bearings, Inc., 5536 Baum Blvd., Pittsburgh 32, Pa.
Colonial Supply Co., 213-217 Fort Pitt Blvd., Pittsburgh 22, Pa.
Holmes Metallic Co., 405 Cedar Ave., Scranton, Pa.
P. S. Oplinger Co., Wescosville, Pa.
Holmes Metallic Co., 519 S. Main St., Wilkes-Barre, Pa.
Bearings, Inc., 1285 E. Princess St., York Pa.
Holmes Metallic Co., 140 E. Third St. Williamsport, Pa.
Rhode Island Supply & Engineering Co., 156 W. Exchange St., Providence 3, R. I.
Cameron Barkley Co., Box 906, 160 Meeting St., Charleston, S. C.
Bearings & Drives of Charleston, 3253 Spruill Ave., Charleston Heights, S. C.
Tidewater Supply Co., Inc., 807-811 Gervais St., P. O. Box 1138, Columbia 1, S. C.
Dixie Bearings, Inc., 407 Pendleton St., Greenville, S. C.
Greenville Textile Supply Co., 504 Rhett St., Greenville, S. C.
Dakota Iron Store, 433 N. Main Ave., Sioux Falls, S. D.
Dixie Bearings, Inc., 2423 S. Broad St., Chattanooga 8, Tenn.
Mills & Lupton Supply Co., 749 E. 12th St., Chattanooga 2, Tenn.
Dixie Bearings, Inc., 130 Clay St., Kingsport, Tenn.
Slip-Not Belting Corp., 432-448 E. Main St., Box 109, Kingsport, Tenn.
Dixie Bearings, Inc., 417 Dale Ave., Knoxville 16, Tenn.
Tidewater Supply Co., Inc., 1508 Island Home Ave., S. E., P. O. Box 377, Knoxville 7, Tenn.
Industrial Supplies, Inc., Poplar Ave. & River Front, P. O. Box 36, Memphis 1, Tenn.
Southern Bearings Service, Inc., 7 E. H. Crump Blvd., Memphis 6, Tenn.
Dixie Bearings, Inc., 511 8th Ave. South, Nashville 3, Tenn.
Moore-Handley, 492-498 Craighead St., Nashville, Tenn.
Carpenter Bearing Co., 628 Walnut St., P. O. Box 2336, Abilene 1, Texas
Capitol Bearing Service, 713 E. 10th St., Amarillo, Texas
M. B. McKee Co. Inc., 100 N.E. Third St., Amarillo, Texas
San Antonio Machine & Supply Co., 613 E. 2nd St., Box 1907, Amarillo, Texas
Seymour Bearing Co., 501 E. 3rd St., Amarillo, Texas
Capitol Bearing Service, 613 Trinity St., Austin, Texas
Dependable Motor Parts, 1913 7th St., Bay City, Texas
Johnston Bearing & Supply Co., 2855 College St., Beaumont, Texas
Seymour Bearing Co., 905 N. Cedar, Borger, Texas
Burton Bearing & Industrial, Inc., 1344 E. Adams St., Brownsville, Texas
Pelfar, Inc., Wellborn Road, College Station, Texas
Midcap Bearing Service, 4624 Baldwin, Corpus Christi, Texas
San Antonio Machine & Supply Co., Savage Lane, P. O. Box 971, Corpus Christi, Texas
Stewart Dean Bearing Co., P. O. Box 9091, Corpus Christi, Texas
Cottingham Bearings & Service, 7322 Harry Hines, Dallas 19, Texas
Cottingham Bearings & Service, 401 Exposition, Dallas 26, Texas
Hirsch Bros. Machinery Co., 1931 Bassett Ave., Box 226, El Paso, Texas
Cottingham Bearings & Service, 209 Riverside Drive, Fort Worth 2, Texas
Dependable Motor Parts, 225 E. Park St., Freeport, Texas
San Antonio Machine & Supply Co., 114 North "L" St., Harlingen, Texas
Cunningham Bearing Co., 5430 Gulf Freeway, P. O. Box 1987, Houston 23, Texas
Johnston Bearing & Supply Co., 5003 Navigation Blvd., Houston 11, Texas
Cottingham Inc., P. O. Box 325, Longview, Texas
M. B. McKee Co. Inc., 2205 Avenue E., Lubbock, Texas
Lufkin Supply Co., 417-419 Lufkin Ave., Lufkin, Texas
Carpenter Bearing Co., 2420 N. Front St., Midland, Texas
Carpenter Bearing Co., 1308 W. 2nd St., Odessa, Texas
Vance Supply Co., 115 E. First St., Odessa, Texas
Seymour Bearing Co., 641 Cuyler St., Pampas, Texas
Johnston Bearing & Supply Co., 701 Seventh St., Port Arthur, Texas
West Texas Bearing & Supply Co., 230 N. Chadbourne St., San Angelo, Texas
Capitol Bearing Service, 821 N. Alamo St., San Antonio, Texas

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Midcap Bearing Service, 603-605 Main Ave., San Antonio 5, Texas
San Antonio Machine & Supply, 325 N. Center St., San Antonio 6, Texas
Cottingham, Inc., P. O. Box 342, Tyler, Texas
San Antonio Machine & Supply Co., First and Franklin Sts., Waco, Texas
Purvis Bearing Service, 1101 Franklin Ave., Waco, Texas
Burton Auto Supply Inc., 525 E. Highway, Weslaco, Texas
Mims Bearing Co., 1300 Indiana Ave., P. O. Box 2009, Wichita Falls, Texas
H. & J. Supply Co., 540 S. Third West St., Price, Utah
Industrial Supply Co., Inc., 121-135 Social Hall Ave., P. O. Box 600, Salt Lake City 10, Utah
Utah Bearing Co., 1608 S. 2nd St. W., Salt Lake City, Utah
McGraw, James, Inc., Commerce at Third St., Front Royal, Va.
Erwin Supply & Hardware Co., Inc., McClure, Va.
Tidewater Supply Co., Inc., 501-535 W. 24th St., P. O. Box 839, Norfolk 1, Va.
Dixie Bearings, Inc., 1503 Chamberlayne Ave., Richmond 22, Va.
McGraw, James, Inc., 9th & Cary Sts., Richmond 17, Va.
Tidewater Supply Co., Inc., 12th & Byrd Sts., Richmond 10, Va.
Tidewater Supply Co., Inc., Shenandoah at 14th St., Roanoke 8, Va.
Grays-Harbor Equip. Co., 401 S. "F" St., Aberdeen, Wash.
Everett Transmission & Rubber Co., 1106 Hewitt Ave., Everett, Wash.
Lamb-Grays Harbor Co., Inc., Blaine & Firman Sts., Hoquiam, Wash.
Monarch Machine & Tool Co., 410 S. Oregon, Pasco, Wash.
Bearing Engineering & Supply Co., 65 Horton St., Seattle 4, Wash.
Industrial Products Co., 2911 First Ave. South, Seattle 4, Wash.
Carter-Miller Mill Furnishing Co., N. 1324 Ash St., Spokane 11, Wash.
Gerrish Machinery Co., 1011 East E Street, Tacoma 2, Wash.
Drumheller Co., 1 W. Alder St., Walla Walla, Wash.
Wells & Wade Hardware, 201 S. Wenatchee Ave., Wenatchee, Wash.
Central Chain & Transmission Co., Inc., 709 S. First St., Yakima, Wash.
Yakima Bearing C., Inc., 709 First St., Yakima, Wash.
Bluefield Supply Co., Princeton Ave. at Mercer St., Bluefield, W. Va.
Bearings, Inc., 1516 Kanawha Blvd., West, Charleston 2, W. Va.
Pennsylvania & West Virginia Supply Corp., Cowen, W. Va.
Pennsylvania & West Virginia Supply Corp., Elm Grove, W. Va.
Bearings, Inc., 2761 Fifth Ave., Huntington, W. Va.
Logan Hardware & Supply Co., Inc., 18th St., West & Adams Ave., Huntington, W. Va.
Logan Hardware & Supply Co., Inc., 300 Highland Ave., Logan, W. Va.
Heiston, W. H., & Son, 406-408 W. Race St., Martinsburg, W. Va.
Pennsylvania & West Virginia Supply Corp., Morgantown, W. Va.
Bearings, Inc., 713 Gladstone St., Parkersburg W. Va.
Bearings, Inc., 518 Main St., Wheeling, W. Va.
Pennsylvania & West Virginia Supply Corp., P. O. Box 871, Wheeling, W. Va.
Badger Bearing Co., 1125 N. Van Buren St., Milwaukee 1, Wis.
Hewitt Transmission Co., 323 N. Commercial St., Neenah, Wis.
Industrial Distributors, Industrial Ave. at Spruce, P. O. Box 1171, Casper, Wyoming
National Equip. & Supply Co., Inc., 2800 12th St., N. E., Washington 18, D. C.

Littell, F. J. Machine Co. **217**
Vac-U-Mation Div.
4127 Ravenswood Ave., Chicago 13, Ill.

BRANCH OFFICES:
2842 W. Grand Blvd., Rm. 414, Detroit, Mich.
20800 Center Ridge Rd., Rm. 207, Cleveland, Ohio

DISTRIBUTORS:
Tool Engineering Serv., 921 N. 21st St., Birmingham, Ala.
Montague-Harris & Co., 5301 Pacific Blvd., Huntington Park, Calif.
Montague-Harris & Co., 893 Folsom St., San Francisco, Calif.
Mine & Smelter Supply Co., 3800 Race St., Denver, Colo.
Merrill, Melville L., 124 LaSalle Rd., West Hartford, Conn.
Baker Engrg. & Equip. Co., 305 Pattie Ave., Wichita, Kan.
Orr Safety Equip. Co., 300 E. Main St., Louisville 2, Ky.
Allied Equip. Sales, 3622 Leonidas St., New Orleans, La.
Phipps Machinery Co., 1237 Highland Ave., Needham 92, Mass.
Wing & Jabaay, 2685 S. Division Ave., Grand Rapids 7, Mich.
Schulz, W. H., Co., 2438 Franklin Ave., St. Paul 14, Minn.
Meredith Machinery Co., P. O. Box 749, E glewood, N. J.
Marshall, Geo. A., Machy., P. O. 9088, Charlotte, N. C.
Seifreat-Elstad Mach., P. O. Box 536, Far Hill Brch., Dayton 9, Ohio
Hahn, Louis C., 53 Long Lane, Upper Darby, Pa.
D. Nast Machy. Co., 2508 N. Broad St., Philadelphia, Pa.
Nourie, Leonard R., Inc., 2414 W. Liberty Ave., Pittsburgh 26, Pa.
Southwest Air Equip. Co. P. O. Box 954, Fort Worth, Texas
Tidewater Supply Co., 1506 Island Home Ave., Knoxville, Tenn.
Jefferds & Moore, Inc., 3416 Chesterfield Ave., Charleston, W. Va.

Logan Emergency Showers, Inc.
P.O. Box 111, Glendale, Calif.

BRANCH OFFICES:
P.O. Box 248, Corte Madera, Calif.
106 Oak Dr., Baltimore 28, Md.

Louisville Ladder Co.
1101 W. Oak St., Louisville 10, Ky.

Lowery Brothers, Inc.
9332 Anthony Ave., Chicago 17, Ill.

BRANCH OFFICES:
1372 Constance St., New Orleans, La.

Lummis Mfg. Co. **218**
2242 E. Foothill, Pasadena, Calif.

DISTRIBUTORS:
CTL Co., Inc., 1710 W. Stewart, Wausau, Wis.

Luxo Lamp Corp.
Dock St., Port Chester, N. Y.

BRANCH OFFICES:
1683 Jerrold Ave., San Francisco, Calif.

DISTRIBUTORS:
Located in principal cities.

Lynrus Finishing Co., Inc.
South Water at Union,
Poughkeepsie, N. Y.

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Macwhyte Wire Rope Company **193**
2902 14th Ave., Kenosha, Wis.

BRANCH OFFICES:
185 S. Myers St., Los Angeles 33, Calif.
188 King St., San Francisco 7, Calif.
228 S. Desplaines St., Chicago 6, Ill.
144 Thalia St., New Orleans 2, La.
75 Oakman Blvd., Detroit 2, Mich.
2356 Hampden Ave., St. Paul 14, Minn.
324 Frelinghuyen Ave., Newark 12, N. J.
35 Water St., New York City 4, N. Y.
1603 N. W. 14th Ave., Portland 9, Ore.
353 Curry Hollow Rd., Pittsburgh 36, Pa.
T & P Terminal Whse., Fort Worth 1, Texas
87 Holgate St., Seattle 4, Wash.

Magline, Inc.
1952 Mercer St., Pinconning, Mich.

DISTRIBUTORS:
Southeastern Handling Equip. Co., Inc., 2303 7th Ave., S., Birmingham, Ala.
Elm Equip. Co., 256 N. Wash. Ave., P. O. Box 1191, Mobile, Ala.
Kistler Industrial Service, 902 S. Central, P. O. Box 1204, Phoenix, Ariz.
Troy Burns Co., 3015 Lewis St., P. O. Box 7, A. A. Station, Little Rock, Ark.
Elliott Mfg. Co., 1735 Ventura Ave., Fresno 1, Calif.
Billard, W. T., Inc., 734 E. 3rd St., Los Angeles, Calif.
Colson Equip. & Supply Co., 1317 Willow St., Los Angeles, Calif.
Hamerslag Equipment Co., 110 Freeway Blvd., South San Francisco, Calif.
Winn Supply Co., 1676 Main St., P. O. Box 1709, San Diego, Calif.
Yale & Towne Mfg. Co., 5711 Olympic Blvd., Los Angeles, Calif.
Applied Handling Co., 1863 Wazee St., Denver, Colo.
Industrial Trucks, 66 Boston Post Rd., Milford, Conn.
Curtin, R. B., & Sons, 913 W. Adams St., P. O. Box 2545, Jacksonville, Fla.
Curtin, R. B., & Sons, Inc., 1930 E. Hillsboro Ave., Produce Sta. P. O. Box 11428, Tampa, Fla.
Stiles Conveyors & Transmission, 506 N. W. 54th St., Miami, Fla.
Industrial Trucks Inc., 1113 Spring St., N. W., Atlanta, Ga.
Southeastern Handling Equip. Co., Inc., 420 Luckie St. N. W., Atlanta, Ga.
Foster Equip. Co., 719 Abua St., P. O. Box 2834, Honolulu, Hawaii
Allied Equip. Co., 432 First Nat. Bank Bldg., P. O. Box 845, Peoria, Ill.
Manufacturers Aids Co., 2618 N. Laramie, Chicago, Ill.
Plant Equipment Co., 2511 Fifth Ave., P. O. Box 92-2511, Rock Island, Ill.
Material Handling Equip. Co., Inc., 1224 N. Capital Ave., Indianapolis, Ind.
Winter, J. O. & Assoc., 2009 Broadway, Fort Wayne, Ind.
Material Handling & Packaging, 215 Lincoln Way West, Mishawaka, Ind.
Globe Machinery & Supply, E. 1st & Court Ave., P. O. Box 1514, Des Moines, Iowa
S. Riekes & Sons, 614 N. Main St., Wichita, Kans.
Wm. J. Laise Co., Shelby at Fehr, P. O. Box 1236, Louisville, Ky.
Industry Services, Inc., 3714 Airline Highway, P. O. Box 366, Metairie, La.
Mathews, W. D., Machinery Co., 279 Center St., Auburn, Maine
Yarrington & Johns Inc., 324 W. 24th St., Baltimore, Md.
Bowman, A. D., Associates, 415 Mystic Ave., Box 23, Medford 55, Mass.
Jarvis Handling Equip. Co., 1320 Front Ave., N. W., Grand Rapids 4, Mich.
Crissman, Glenn F., Co., 670 W. Baltimore Ave., Detroit, Mich.
Fisher Co., The, 75 Guest St., Battle Creek, Mich.
Hall, Gransden, & Co., 920 Walnut St., Flint, Mich.
Zehnder, P. J., 1619 Hanchett St., Saginaw, Mich.
Nott, W. S., Hyster Div., 2226 E. Lake, Minneapolis, Minn.
Hutcheson, L. O., & Associates, P. O. Box 9769, Kansas City, Mo.
Massey Equip. Co., 1011 Woodbine Dr., St. Louis 19, Mo.
Riekes Equip. Co., 2910 Cuming, Box 1031, Omaha 31, Neb.
Material Handling Associates Inc., 58 S. Day St., Orange, N. J.
Northern Handling Supply Co., P. O. Box 633, 262 Genesee St., Utica, N. Y.
Raymond Corp., 647 S. Warren, Syracuse, N. Y.
Eastern Industrial Sales Co., 136 Huguenot St., New Rochelle, N. Y.
George E. Kenneth, 234 E. 38th St., New York, N. Y.
Insley-McEntee Equip. Co., 1112 Emerson, Rochester 6, N. Y.
Mast, Charles, 129 Mang Ave., Kenmore, N. Y.
Rushmore Weber & Case Inc., 959 New Loudon Rd., Latham, N. Y.
Trethewey, F. H., Co., 501 Dowd Rd., P. O. Box 1193, Charlotte, N. C.
Bohl Equipment Co., 534 Laskey Rd., Toledo, Ohio
Davis, John Marc, Supply Co., 4039 Rose Hills Ave., Cincinnati 29, Ohio
Sliffe, Robert M., and Associates, 2754 Woodhill Ave., Cleveland, Ohio
Ludlow Sales & Service, 1763-1775 S. High St., Columbus, Ohio
Mulford, John P., Far Hills, Box 603, Dayton, Ohio
Valley Industrial Trucks Inc., 1152 Meadowbrook Ave., Youngstown, Ohio
Stone, Carl D., Equip. Co., 1407 E. 6th St., Tulsa, Okla.
Air Mac, Inc., 1111 S. E. Grand Ave., Portland, Ore.
Clark Materials Handling Co., 2903 Johnstown Rd., Rt. 22 East, Harrisburg, Pa.
Cope, J. Morris, P. O. Box 247, Lansdowne, Pa.
Erie Materials Handling Co., 2401 W. 12th, Erie, Pa.
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Jones Engineering Prod., 3416 Fairfield, Fort Wayne 2, Ind.
Engineering Metal Prod. Corp., 620 S. Belmont Ave., Indianapolis 7, Ind.
Lemke Builders Supply Co., 610 Walnut Bldg., Des Moines 9, Iowa
Atlas Plaster & Supply Co., 30th & Greenwood, Louisville 11, Ky.
Talbott & Degele, Inc., 328 E. 25th St., Baltimore 18, Md.
Fogarty, R. D., Co., 1211 Washington St., Box N, West Newton 65 (Boston), Mass.
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Haven-Busch & Sons, 3443 Chicago Dr. W. S., Grandville (Grand Rapids), Mich.
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Spath, Frank J., 32 Buckingham Dr., Albany 8, N. Y.
Maurer Co., Inc., 31 Richmond St., Rochester 7, N. Y.
Johnson, B. R., & Son, 5900 S. Salina St., Syracuse 5, N. Y.
Johnson, B. R., & Son, 127 N. Indiana, Box 312, Watertown, N. Y.
Huenefeld, C. C., 626 Broadway, Cincinnati 2, Ohio
Irelan, C. F., 405 Caxton Bldg., Cleveland 15, Ohio
Northwest Tube & Metal Fabricators, 2658 S. E. Tenino St., Portland 14, Ore.
Pitcairn, James R., 511 Wood St., 2301 First Nat'l Bank Bldg., Pittsburgh 22, Pa.
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Bradley-Zesbaugh, Inc., 5507 White-Henry-Stuart Bldg., Seattle 1, Wash.
Heinz, W. M., & Son, 757 N. Broadway, Rm. 255, Milwaukee 2, Wis.

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6936 Tulip St., Philadelphia 35, Pa.

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Griffin, A. L., & Co., 20 Custom House Wharf, Portland, Me.
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Maryland Ship Supply Co., 114 S. Frederick St., Baltimore, Md.
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Boston Provision Co., 30 Atlantic Ave., Boston, Mass.
Antrim Hardware Co., 1514 Federal St., Camden, N. J.
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Mercantile Ship Supply Co., 5 Water St., New York, N. Y.
Toledo Marine Supply, 1646 N. Erie St., Toledo, Ohio
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Delaware Ship Supply Co., 1117 S. Second St., Philadelphia, Pa.
Bergendahl Co., Inc., 114 S. Front St., Philadelphia, Pa.
Southeast Supply Co., 10 Linguard St., Charleston, S. C.
Texas Marine Supply Co., 8106 Harrisburg Blvd., Houston, Texas
Sieffert, J. C., Ship Supply Co., 612 2nd Ave., Texas City, Texas
Cavalier Marine Supply, 57 Commerce St., Norfolk, Va.
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International Sales Co., 1230 Westlake Ave., Seattle, Wash.
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Joseph Oduber, Essoville-San Nicolas, Aruba, Netherland Antilles
Dodd Industrial Supply Co., 78 Commerce St., Mayaguez, P. R.
Gaston Renaud Tapie, Casa Daner, Havana, Cuba
Paria Ltd., 56 Sackville St., Port of Spain, Trinidad
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Safety Solvents Ltd., Box 10, Egham, Surrey, England
Zaloom & Saman, Box 1622, Beirht, Lebanon
Shimoi & Co., Ltd., 20 Sagiyama Naka-Ku, Yokahama, Japan
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Pioneer Rubber Co. of Texas, 1515 Dragon St., Dallas 7, Texas

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Selma Parts Service Co., Inc., 1417 Water Ave., Selma, Ala.
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Complete Auto & Home Supply Co., 530 N. Stone Ave., Tucson, Ariz.
Duncan-Hunter Co., 8215 S. Avalon Blvd., Los Angeles 3, Calif.
Colyear Motor Sales Co., 600 E. Washington Blvd., Los Angeles 15, Calif.
Lambert Co., Ltd., 1202 E. Olympic Blvd., Los Angeles 21, Calif.
Chanslor & Lyon Co., 730 Polk St., San Francisco 19, Calif.
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Friedman, Chas., Co., 1320 North Ave., Bridgeport, Conn.
Humphrey Bros., 348 Main St., Danbury, Conn.
Grinold Auto Parts, Inc., 354 Hudson St., Hartford 5, Conn.
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Vaughn & Wright of Ft. Lauderdale, Inc., 16 N. E. 4th St., Ft. Lauderdale, Fla.
Norman Auto Supply, 1401 Main St., Fort Myers, Fla.
Motor Parts & Supply Co., 110 Lee St., Jacksonville 4, Fla.
Miami Parts & Spring Co., 1465 N. W. 21st Terrace, Miami, Fla.
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Pensacola Automotive Supply, 212 W. Intendencia St., Pensacola, Fla.
Keenan Auto Parts of Tallahassee, 412 N. Duval St., Tallahassee, Fla.
Budd Auto Supply Co., 310 9th St. N., St. Petersburg 2, Fla.
Vaughn & Wright of West Palm Beach Inc., 524 1st St., West Palm Beach, Fla.
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Alexander-Seewald Co., 1410 Seaboard Industrial Blvd. N. W., Atlanta 18, Ga.
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Auto Supply Co., Inc., 1510 1st Ave., Columbus, Ga.
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Pittsburgh Auto Equip. Co., 631 N. Mechanic St., Cumberland, Md.
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Motor Parts Service, Inc., 57 Main St., Fitchburg 1, Mass.
Tarbell-Waters Co., 11 Olive St., Greenfield, Mass.
Burns Automotive Parts, Inc., 50 Fleet St., Haverhill, Mass.
Towers Motor Corp. of Lawrence, 382 Broadway, Lawrence, Mass.
Towers Motor Parts Corp., 80 Church St., Lowell, Mass.
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Ohio Battery & Ignition Co., 831 Market Ave. N. Canton, Ohio
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Automotive Supplies Inc., 595 W. Church St., Newark, Ohio
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Bradford Motor Parts Co., 62-64 Webster Ave., Bradford, Pa.
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Miller Auto Parts, 28 N. 2nd St., Clearfield, Pa.
Auto Parts Co., Inc., 236 W. Long Ave., DuBois, Pa.
Snyder, J. D., 1019 Northampton St., Easton, Pa.
Pennsylvania Rubber & Supply Co., 237 E. 7th St., Erie, Pa.
Harrisburg Auto Parts, 1021 Market St., Harrisburg, Pa.
Hazelton Automotive Service, 316 E. Noble St., Hazelton, Pa.
Auto Parts Co., Inc., Taylor & Gompers Ave., Indiana, Pa.
Automotive Supply Co., 111 Adams St., Johnstown, Pa.
Paul's Auto Parts, 215 Jacob St., Kittaning, Pa.
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Auto Specialty Co., Inc., 525 Loyal St., Danville, Va.
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Chesapeake Auto Supply, 21st & Granby St., Norfolk, Va.
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Richmond Auto Parts, 1207 N. Boulevard, Richmond, Va.
Auto Spring & Bearings Inc., 100 Luck Ave. S. W., Roanoke, Va.
Simmons Parts Co., Inc., 119 S. Augusta St., Staunton, Va.
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Motor Car Supply, 4th Ave. & 6th St., Huntington, W. Va.
Motor Car Supply Co., Logan, W. Va.
Pittsburgh Auto Equip. Co., 13-17 Beechurst Ave., Morgantown, W. Va.
Motor Car Supply, 1505 13th St., Parkersburg, W. Va.
Ohio Valley Battery & Ignition, 16th & Eoff St., Wheeling, W. Va.
Williamson Supply Co., 206 2nd Ave., Williamson, W. Va.
Rudy, Fred P., Co., 5825 8th Ave., Kenosha, Wis.
Motor Parts & Equip., Inc., 2nd & States Sts., LaCrosse, Wis.
Northern Auto Supply Co., Marshfield, Wis.
Shadbolt & Boyd Co., 413 N. 2nd St., Milwaukee 1, Wis.
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Industrial Safety Supply, 574 New Park Ave., W. Hartford, Conn.
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Edwards & Roberts, 240 E. Wabash Ave., Decatur, Ill.
Black & Co., 22 S. 8th St., Springfield, Ill.
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Kidds, Walter, Sales Co., 1041 St. Peters St., New Orleans, La.
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Steinwach's Supply Co., 1573 S. Park Ave., Buffalo, N. Y.
Acme Safety Prod., 387-389 Storer Ave., Akron, Ohio
Cleveland Ladder Co., 13921 Aspinall Ave., Cleveland, Ohio
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Milt Hemling Sales, 433 W. Prospect Ave., Appleton, Wis.
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Anderson Fire Equip. Co., 2421 Farnam St., Omaha, Neb.
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Sargent-Sowell, Inc., 1211 E. Jefferson, Grand Prairie, Texas
Surgical Supply Center, 357 S. 2nd, East, Salt Lake City, Utah
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Welsh Mfg. Co.
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Davis Emergency Equip. Co., 130 W. Emerson St., Melrose, Mass.
Bankie Supply Co., 2944 Woodward Ave., Detroit, Mich.
Safety Services Inc., 1903 W. Main St., Kalamazoo, Mich.
Factory Supply Co., 1036 Terrance St., Muskegon, Mich.
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Noland Company Inc., 204 W. Fortification St., Jackson, Miss.
Reis Equipment Co., 1417 Tower Grove Ave., St. Louis, Mo.
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Notte Safety Appliances, 308 Main St., East Orange, N. J.
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Gebler Supply Co., P. O. Box 739, Binghamton, N. Y.
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Somers, Fitler & Todd Co., 325 Fort Pitt Blvd., Pittsburgh, Pa.
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American Fire & Safety Equip., 514 Fifth Ave., Nashville, Tenn.
Noland Co. Inc., 1st and Main Sts., Nashville, Tenn.
Radcliff Supply Co., 115 Polk St., Amarillo, Tex.
Settle Safety Supply Co., Box 9631, Dallas, Tex.
Hughes, David L., 7602 Navigation Blvd., Houston, Tex.
Manson, L. A. & Co., Box 6611, Houston, Tex.
Universal Safety & Fire Equip., 727 S. W. Temple, Salt Lake City, Utah
Noland Co. Inc., 604 Henry Ave., Charlottesville, Va.
Noland Co., Inc., 122 S. 8th St., Richmond, Va.
Safety & Supply Co., 115 Blanchard St., Seattle, Wash.
Industrial Safety Supply Co., 5518 MacCorkle Ave. S. E., Charleston, W. Va.
Safety Equipment Engr'n Co., P. O. Box 963, Green Bay, Wis.
Pagel Safety Products, 4611 W. National Ave., Milwaukee, Wis.
Noland Co., 136 K. St. N. E., Washington, D. C.

IN CANADA

Levitt-Safety Ltd., 889 Westminster Ave., Winnipeg, Manitoba, Canada
Levitt-Safety Ltd., 747 Vaughan Rd., Toronto, Ontario, Canada
Levitt-Safety Ltd., 4205 Courtral Ave., Montreal, Quebec, Canada

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National Mine Service Co., Bemeco Div., Box 32, Beckley, W. Va.
Safety First Supply Co., 1104 Quarrier St., Charleston, W. Va.
All-State Division, National Mine Service, P. O. Box 1671, Logan, W. Va.
Mountaineer Division, National Mine Service, 165 Holland Ave., Morgantown, W. Va.
Safety First Supply Co., 47 Garland Ave., Wheeling, W. Va.
Protective Equip., Inc., 2001 W. Capitol Dr., Milwaukee 6, Wis.
Casper Supply Co., 444-448 S. Center St., P. O. Box 880, Casper, Wyo.
Safety Supply Co., 214 King St., E., Toronto 2, Ont., Canada
Safety Supply Co., 1216 Ninth Ave., S.E., Calgary, Alb., Canada
Safety Supply Co., 10206 106th St., Edmonton, Alb., Canada
Safety Supply Co., 25 MacLean St., Halifax, N.S., Canada
Safety Supply Co., 5545 St. James St., W., Montreal 28, Que., Canada
Safety Supply Co., 199 Queen St., Ottawa, Ont., Canada
Safety Supply Co., 1840 Broad St., Regina, Sask., Canada
Safety Supply Co., 1198 Cedar Ave., Trail, B. C., Canada
Safety Supply Co., 240 E. 10th Ave., Vancouver, B. C., Canada
Safety Supply Co., 168 Osborne St., S., Winnipeg, Man., Canada
Safety Supply Co., 215 Park St., Port Arthur, Ont., Canada

Wilson Rubber Co. **128**
Div. of Becton, Dickinson & Co.
1200 Garfield Ave., S. W., Canton 6, Ohio

PACIFIC COAST WAREHOUSE:
530 Howard St., San Francisco 5, Calif.

Wire Rope Corp. of America, Inc.
609 N. 2nd St., St. Joseph, Mo.

BRANCH OFFICES:
1018 S. Santa Fe, Los Angeles, Calif.
370 10th St., San Francisco, Calif.
3649 E. 40th Ave., Denver, Colo.
375 Washington Ave., North Haven, Conn.
3101 Third Ave., Tampa, Fla.
665 8th St., N. W., Atlanta, Ga.
2452 N. Greenview Ave., Chicago, Ill.
1949 Lafayette St., New Orleans, La.
467 Montgomery St., Shreveport, La.
1705 W. LaFayette St., Detroit, Mich.
3006 Hatherly Dr., St. Louis, Mo.
39 Comet St., Buffalo, N. Y.
105 Hudson St., New York, N. Y.
1021 Depot St., Cincinnati, Ohio
302 E. Brady, Tulsa, Okla.
2221 N. W. Thurman St., Portland, Ore.
850 N. Watts St., Philadelphia, Pa.
1004 Washington Blvd., Pittsburgh, Pa.
715 N. 5th St., Abilene, Texas
4613 Calhoun, Houston, Texas
5507 Andrews Highway, Odessa, Texas
257 E. Georgia Ave., Memphis, Tenn.
1104 Main St., Charleston, W. Va.

Wolverine Shoe & Tanning Corp.
Rockford, Mich.

Wooster Products, Inc.
1000 Spruce St., Wooster, Ohio

Worklon, Inc. **172**
253 W. 28th St., New York 1, N. Y.

BRANCH OFFICES:
1007 Madison Ave., Los Angeles 29, Calif.

Wyandotte Chemicals Corp. **45**
J. B. Ford Div., Wyandotte, Mich.

DISTRICT SALES OFFICES:
8921 Dice Rd., Los Nietos, Calif. Mail: Box 2147
1575 Northside Dr., N.W., Atlanta, Ga., Mail: Box 2613, Sta. D.
400 N. Michigan Ave., Chicago, Ill.
1113 Statler Bldg., Boston, Mass.
1120 Dime Bldg., Detroit, Mich.
1104 Currie Ave., Minneapolis, Minn.
224 Mill Creek Bldg., 4633 J. C. Nichols Pkwy., Kansas City, Mo.
Suite 610, Shell Bldg., 1221 Locust St., St. Louis, Mo.
809 Liberty Bank Bldg., 424 Main St., Buffalo, N. Y.
4723 Empire State Bldg., New York, N. Y.
218 Wilford Bldg., 33rd & Arch Sts., Philadelphia, Pa.
500-A Dixie Terminal Bldg., Cincinnati, Ohio
1116-1010 Euclid Bldg., Cleveland, Ohio
2727 Oaklawn, Dallas, Texas
659 Skinner Bldg., Seattle, Wash.
15 Glen Watford Dr., Agincourt, Ont., (Toronto), Canada

JOBBERS:
Located throughout U. S. & Canada

—X—

X-Ray Monitoring Corp. **258**
43 W. 61st St., New York 23, N. Y.

—Z—

Zenith Radio Corp.
5801 Dickens Ave., Chicago 39, Ill.

Please mention National Safety News when contacting any of these organizations.

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Section 1
Plant Design & Construction

Abrasives
American Optical Co., Safety Products Div.
Boyer-Campbell Co.
Herculite Protective Fabrics
Linde Company, Div. of Union Carbide Corp.
Minnesota Mining & Mfg. Co.
Norton Company
Pangborn Corp.
Pres-on Products Co.
Scientific Industrial Supply Co.
Wheelabrator Corp.

Adhesive, Tile, Non-Flammable or Toxic
Pecora, Inc.

Barricades, Traffic
American Allsafe Co., Inc.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Bright Star Industries
Canisteo Sign & Mfg. Co., Inc.
Davis Emergency Equip. Co., Inc.
Dietz, R. E., Co.
General Scientific Equip. Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Pacific Mercury Electronics
Park Industries, Inc.
Prairie State Prod. Co.
Safety First Supply Co.
West Side Iron Works, Inc.

Conductometer
Conductive Hospital Accessories Corp.
Leeds & Northrup Co.

Conveyors
Bil-Jax, Inc.
Colorado Fuel & Iron Corp.
Link-Belt Co.
Multifinish Mfg. Co.
United States Rubber Co.

Detectors, Static
Detectogas Instruments, Inc.
Landsverk Electrometer Co.

Flooring Materials, Safety
American Abrasive Metals Co.
American Allsafe Co., Inc.
American Mason Safety Tread Co.
Boyer-Campbell Co.
Brabrook, A. N., Inc.
Bustin Steel Products, Inc.
Eagle-Picher Co.
Federal Flooring Corp.
Finnell System, Inc.
Fulton Asphalt Co.
Globe Co., Products Div.
Goodrich, B. F., Footwear & Flooring Co.
Herculite Protective Fabrics
Hillyard Chemical Co.
Horn, A. C., Companies Sub. & Div. of Sun Chemical Corp.
Irving Subway Grating Co., Inc.
Lancaster Chemical Corp.
Legge, Walter G., Co., Inc.
Meiflex Products Co., Inc.
Mine Safety Appliances Co.
Miracle Adhesives Corp.
Moore, Samuel, & Co.
Press-on Products Co.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Truscon Laboratories
United States Rubber Co.

Floor Plate, Abrasive
Alan Wood Steel Co.
Aluminum Co. of America
American Abrasive Metals Co.
American Allsafe Co., Inc.
American Mason Safety Tread Co.
United States Steel Corp.

Floor Plate, Steel
Alan Wood Steel Co.
American Allsafe Co., Inc.
Bustin Steel Products, Inc.
Inland Steel Co.
Jones & Laughlin Steel Corp.
United States Steel Corp.

Fluorescent Lamp Locks
Boyer-Campbell Co.
General Scientific Equip. Co.
Laduby Co., Inc.
Pendergast, Albert W., Safety Equip. Co.

Fluorescent Tube Changers
Industrial Prod. Co.
Pendergast, Albert W., Safety Equip. Co.

Fluorescent Tube Disposal
Laduby Co., Inc.
New Jersey Safety Equip. Co.

Grating, Safety
Boyer-Campbell Co.
Bustin Steel Products, Inc.
Globe Co., Products Div.
Irving Subway Grating Co., Inc.
Marryatt-Lane & Co., Inc.
United States Steel Corp.

Guard Rails, Safety
Black, Sivalls & Bryson, Inc.
Bustin Steel Products, Inc.
Aluminum Co. of America
Hollaender Mfg. Co.
Irving Subway Grating Co., Inc.
Marryatt-Lane & Co., Inc.
Morland Associates
United States Steel Corp.

Indicators, Static
Detectogas Instruments, Inc.
Sticht, Herman H., Co., Inc.

Intercommunication Equipment
National Mine Service Co.
Notifier Corp.
Talk-A-Phone Co.

Lamps, Electric
Dietz, R. E., Co.
General Electric Co., Large Lamp Department
Halprin Supply Co.
Lewis Instruments Inc.
Luxo Lamp Corp.
National Mine Service Co.
Pendergast, Albert W., Safety Equip. Co.
Safety First Supply Co.
Swivelier Company, Inc.
U-C-Lite Mfg. Co.

Lamps, Safety
Bright Star Industries
Dietz, R. E., Co.
Davis Emergency Equip. Co., Inc.
General Electric Co., Large Lamp Department
Halprin Supply Co.
Hindle Transformer Co., Inc.
Joy Mfg. Co., Electrical Prod. Div.
Lewis Instruments Inc.
Mine Safety Appliances Co.
National Mine Service Co.
Portable Light Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Spaulding Fibre Co., Inc.
Swivelier Company, Inc.
Tedcar Products Co.
Trippe Mfg. Co.
U-C-Lite Mfg. Co.

Lighting, Outdoor
Dietz, R. E., Co.
Electric Cord Co.
Pyle-National Co.
Stonco Electric Products Co.
Swivelier Company, Inc.

Lighting Equipment, Industrial
Bright Star Industries
Carpenter Mfg. Co.
Day-Brite Lighting, Inc.
Dietz, R. E., Co.
Electric Cord Co.
Luxo Lamp Corp.
Pyle-National Co.
Rochester Safety Equip. Co., Inc.
Stonco Electric Products Co.
Swivelier Company, Inc.
Tedcar Products Co.
U-C-Lite Mfg. Co.
Wasco Products, Inc.

Line Markers
American Allsafe Co., Inc.
Boyer-Campbell Co.
Brossard, Lester L., Co.
Hillyard Chemical Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Markers, Traffic Line
American Allsafe Co., Inc.
Boyer-Campbell Co.
Brossard, Lester L., Co.
General Scientific Equip. Co.
Hillyard Chemical Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
Minnesota Mining & Mfg. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Prairie State Prod. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Westline Prod. Div., Western Lithograph Co.

Mats, Standing
American Allsafe Co., Inc.
American Biltrite Rubber Co., Boston Woven Hose & Rubber Div.
American Mat Corp.
Boyer-Campbell Co.
Brabrook, A. N., Inc.
Bustin Steel Products, Inc.
Custom Crown Sales Co.
Emerson, J. H., Co.
Industrial Prod. Co.
Irving Subway Grating Co., Inc.
Meiflex Products Co., Inc.
Moor, D. W., Co.
Moore, Samuel, & Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Security Controls, Inc.
Snyder, M. L., & Son, Inc.
Superior Rubber Mfg. Co.
Wear Proof Mat Co.

Mats, Switchboard
American Allsafe Co., Inc.
American Biltrite Rubber Co., Boston Woven Hose & Rubber Div.
American Mat Corp.
Boyer-Campbell Co.
Brabrook, A. N., Inc.
Industrial Prod. Co.
Meiflex Products Co., Inc.
Moor, D. W., Co.
Moore, Samuel, & Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Salisbury, W. H., & Co.
Snyder, M. L., & Son, Inc.
Superior Rubber Mfg. Co.
Wear Proof Mat Co.

Matting, Floor and Stair
American Allsafe Co., Inc.
American Biltrite Rubber Co., Boston Woven Hose & Rubber Div.
American Mat Corp.
Boyer-Campbell Co.
Brabrook, A. N., Inc.
Bustin Steel Products, Inc.
Custom Crown Sales Co.
Emerson, J. H., Co.
General Scientific Equip. Co.
Industrial Prod. Co.
Meiflex Products Co., Inc.
Moor, D. W., Co.
Moore, Samuel, & Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Superior Rubber Mfg. Co.
United States Rubber Co.
Wear Proof Mat Co.

Mirrors, Plant Traffic
American Allsafe Co., Inc.
Boyer-Campbell Co.
Brossard, Lester L., Co.
Dietz, R. E., Co.
General Scientific Equip. Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Norman Industries, Inc.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Silver, Fred & Co.

Paint, Abrasive Resurfacing
American Abrasive Metals Co.
American Allsafe Co., Inc.
Horn, A. C., Companies Sub. & Div. of Sun Chemical Corp.
Industrial Prod. Co.
Kelley, The, Paint Co.
Legge, Walter G., Co., Inc.
Magnus Chemical Co., Inc.
Mine Safety Appliances Co.
Miracle Adhesives Corp.
Pittsburgh Plate Glass Co.
Protectoseal Company
Safety Clothing & Equip. Co.
Safety First Supply Co.
Walton-March

Pipe Markers
American Allsafe Co., Inc.
Boyer-Campbell Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Westline Products Div., Western Lithograph Co.

Plant Layout Materials
Chart-Pak, Inc.

Ramps and Runways
Beaver-Advance Corp.
Bustin Steel Products, Inc.
Chaney Products
Irving Subway Grating Co., Inc.
Magline Inc.

See directory of Safety Equipment Sources for addresses.

Stair Treads, Safety

Aluminum Co. of America
American Abrasive Metals Co.
American Allsafe Co., Inc.
American Mason Safety Tread Co.
Black, Sivalls & Bryson, Inc.
Boyer-Campbell Co.
Bustin Steel Products, Inc.
General Scientific Equip. Co.
Globe Co.,
Products Div.
Goodrich, B. F., Footwear & Flooring Co.
Industrial Prod. Co.
Irving Subway Grating Co., Inc.
Marryatt-Lane & Co., Inc.
Meiflex Products Co., Inc.
Minnesota Mining & Mfg. Co.
Moor, D. W., Co.
Moore, Samuel, & Co.
Norton Company
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Superior Rubber Mfg. Co.
United States Rubber Co.
Walton-March
Wheeling Corrugating Co.
Wooster Products, Inc.

Stairways

Black, Sivalls & Bryson, Inc.
Bustin Steel Products, Inc.
Marryatt-Lane & Co., Inc.
United States Steel Corp.

Steps, Safety

American Abrasive Metals Co.
American Allsafe Co., Inc.
American Mason Safety Tread Co.
Ballymore Company
Beaver-Advance Corp.
Bullard, E. D. Co.
Globe Co.,
Products Div.
Irving Subway Grating Co., Inc.
Marryatt-Lane & Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Tables, Luncheon

Chicago Hardware Foundry Co.
Karel First Aid Supply Co.

Treads, Floor

American Abrasive Metals Co.
American Mason Safety Tread Co.
Globe Co.,
Products Div.
Industrial Prod. Co.
Irving Subway Grating Co., Inc.
Superior Rubber Mfg. Co.

Trolley Conveyors

Link-Belt Co.

Turbines, Steam

Coppus Engineering Corp.

Section 2
Housekeeping and Maintenance

Absorbents, Oil and Grease

Canfield Oil Co.
Dameron Enterprises, Inc.
Dri-Rite Co.
Eagle-Picher Co.
Flor-Dry Co., The
Floridin Company
Industrial Prod. Co.
Johns-Manville Sales Corp.
Legge, Walter G., Co., Inc.
Oakite Products, Inc.
Oil-Dri Corp. of America
Scientific Industrial Supply Co.
Speedi-Dri Div.,
Minerals & Chemicals Corp. of America
Wyandotte Chemicals Corp.

Barricades, Flashing

American Allsafe Co., Inc.
Dietz, R. E., Co.
General Scientific Equip. Co.
New Jersey Safety Equip. Co.
Pacific Mercury Electronics
Prairie State Prod. Co.
Tedcar Products Co.
West Side Iron Works, Inc.

Barricades, Rope

Jay, D., Products Co., Inc.

Bins, Towels

New Jersey Safety Equip. Co.
Protectoseal Company

Cabinets, Towels

Carey, The Philip, Mfg. Co.
Huntington Laboratories, Inc.
Rochester Safety Equip. Co., Inc.
West Chemical Prod., Inc.

Cleaning Machines, Floor, Electric

Brulin & Co., Inc.
Clarke Floor Machine Co.
Finnell System, Inc.
Hild Floor Machine Co., Inc.
Hillyard Chemical Co.
Holt Mfg. Co.
Multi-Clean Products, Inc.
National Chemsearch Corp.
Spencer Turbine Co.
Tennant, G. H., Co.
West Chemical Prod., Inc.

Cleaning Machines, Floor, Explosion-Proof

Brulin & Co., Inc.
Finnell System, Inc.
Hild Floor Machine Co., Inc.
Holt Mfg. Co.
Multi-Clean Products, Inc.
Spencer Turbine Co.

Compounds, Rust Preventive, Non-Flammable

Daubert Chemical Co.
Oakite Products, Inc.

Compounds, Sweeping

Associated Just Distributors, Inc.
Finnell System, Inc.
Goodrich, B. F., Footwear & Flooring Co.
Hillyard Chemical Co.
Huntington Laboratories, Inc.
Oakite Products, Inc.
Scientific Industrial Supply Co.
West Chemical Prod., Inc.

Conductive Floor Tester

Conductive Hospital Accessories Corp.
Monaghan, J. J., Co., Inc.

Degreasers, Parts

Brulin & Co., Inc.
Graymills Corp.
Huntington Laboratories, Inc.
Moore, John B., Corp.
Oakite Products, Inc.
Packwood, G. H., Mfg. Co.
Practical Mfg. Co.
Magnus Chemical Co., Inc.
Penetone Company
Speco, Inc.
Tect, Inc.
West Chemical Prod., Inc.

Floor Coating, Conductive, Non-Slip

American Abrasive Metals Co.
Brabrook, A. N., Inc.
Brulin & Co., Inc.
Dameron Enterprises, Inc.
Federal Flooring Corp.
Finnell System, Inc.
Flintkote Company
Frost Paint and Oil Corp.
Fulton Asphalt Co.
Herculite Protective Fabrics
Hild Floor Machine Co., Inc.
Hillyard Chemical Co.
Huntington Laboratories, Inc.
Kelly, The, Paint Co.
Legge, Walter G., Co., Inc.
Magnus Chemical Co., Inc.
Majestic Wax Co.
Mine Safety Appliances Co.
Miracle Adhesives Corp.
Norton Company
Penetone Company
Rochester Germicide Co.
Safety First Supply Co.
Truscon Laboratories
West Chemical Prod., Inc.

Floor Finishing Compounds

Associated Just Distributors, Inc.
Brulin & Co., Inc.
Du Pont, E. I. de Nemours & Co., Inc.
Finnell System, Inc.
Flintkote Company
Frost Paint and Oil Corp.
Fulton Asphalt Co.
Goodrich, B. F., Footwear & Flooring Co.
Hild Floor Machine Co., Inc.
Hillyard Chemical Co.
Huntington Laboratories, Inc.
Legge, Walter G., Co., Inc.
Magnus Chemical Co., Inc.
National Chemsearch Corp.
Penetone Company
Rochester Germicide Co.
West Chemical Prod., Inc.

Ice Control Materials

Huntington Laboratories, Inc.
National Chemsearch Corp.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
Speco, Inc.
Walton-March

Ladder Climbers

American Allsafe Co., Inc.
Boyer-Campbell Co.
Cleveland Ladder Co.
Industrial Prod. Co.
Meyer Machine, Inc.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Werner, R. D., Co., Inc.

Ladder Shoes or Feet

Aluminum Ladder Co.
American Allsafe Co., Inc.
American Mason Safety Tread Co.
American Optical Co.,
Safety Products Div.
Babcock, W. W., Co., Inc.
Boyer-Campbell Co.
Cleveland Ladder Co.
Duo-Safety Ladder Corp.
General Scientific Equip. Co.
Halprin Supply Co.
Hillyard Chemical Co.
Industrial Prod. Co.
Johnson Ladder Shoe Co., Inc.,
Meiflex Products Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Patent Scaffolding Co., Inc.
Pendergast, Albert W., Safety Equip. Co.
Putnam Rolling Ladder Co., Inc.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Werner, R. D., Co., Inc.

Ladders, Aluminum

Aluminum Ladder Co.
American LaFrance,
Div. of Sterling Precision Corp.
Ballymore Company
Boyer-Campbell Co.
Cleveland Ladder Co.
Cotterman, I. D.
Cramer Posture Chair Co., Inc.
Duo-Safety Ladder Corp.
Fyr-Fyter Co.
Halprin Supply Co.
Industrial Prod. Co.
Louisville Ladder Co.
Marryatt-Lane & Co., Inc.
Patent Scaffolding Co., Inc.
Putnam Rolling Ladder Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Werner, R. D., Co., Inc.

Ladders, Fibreglass

Aluminum Ladder Co.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Cleveland Ladder Co.
Hopfeld Indust. Mfg. Co.
New Jersey Safety Equip. Co.
Putnam Rolling Ladder Co., Inc.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
Werner, R. D., Co., Inc.

Ladders, Marine

Aluminum Ladder Co.
Bustin Steel Products, Inc.
Cleveland Ladder Co.
Duo-Safety Ladder Corp.
Louisville Ladder Co.
Magnesium Co. of America
Marryatt-Lane & Co., Inc.
Putnam Rolling Ladder Co., Inc.
Werner, R. D., Co., Inc.

Ladders, Rolling

Aluminum Ladder Co.
Ballymore Company
Cleveland Ladder Co.
Cotterman, I. D.
Louisville Ladder Co.
Patent Scaffolding Co., Inc.
Putnam Rolling Ladder Co., Inc.
Rol-Away Truck Mfg. Co., Inc.
Safe-Lad Mfg. Co.
Safety First Supply Co.
Werner, R. D., Co., Inc.

Ladders, Rung, Safety

Aluminum Ladder Co.
Babcock, W. W., Co., Inc.
Black, Sivalls & Bryson, Inc.
Bustin Steel Products, Inc.
Cleveland Ladder Co.
Duo-Safety Ladder Corp.
Halprin Supply Co.
Louisville Ladder Co.
Marryatt-Lane & Co., Inc.
Patent Scaffolding Co., Inc.
Putnam Rolling Ladder Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Werner, R. D., Co., Inc.

To locate Advertisements, see Advertisers' Index.

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Black, Sivalls & Bryson, Inc.
Boyer-Campbell Co.
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Cleveland Ladder Co.
Cotterman, I. D.
Cramer Posture Chair Co., Inc.
Duo-Safety Ladder Corp.
Goshen Mfg. Co.
Halprin Supply Co.
Hopfeld Indust. Mfg. Co.
Industrial Prod. Co.
Louisville Ladder Co.
Marryatt-Lane & Co., Inc.
Meyer Machine, Inc.
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Putnam Rolling Ladder Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Werner, R. D., Co., Inc.

Ladders, Special

Aluminum Ladder Co.
Babcock, W. W., Co., Inc.
Ballymore Company
Black, Sivalls & Bryson, Inc.
Bustin Steel Products, Inc.
Cleveland Ladder Co.
Cotterman, I. D.
Duo-Safety Ladder Corp.
Economy Engineering Co.
Louisville Ladder Co.
Magnesium Co. of America
Marryatt-Lane & Co., Inc.
Morland Associates
Patent Scaffolding Co., Inc.
Putnam Rolling Ladder Co., Inc.
Rochester Safety Equip. Co., Inc.
Truck Equip. Co.
Werner, R. D., Co., Inc.

Ladders, Tower Safety

Aluminum Ladder Co.
American Allsafe Co., Inc.
Black, Sivalls & Bryson, Inc.
Economy Engineering Co.
Industrial Prod. Co.
Louisville Ladder Co.
Marryatt-Lane & Co., Inc.
Meyer Machine, Inc.
Rose Mfg. Co.
Safety Tower Ladder Co.
Werner, R. D., Co., Inc.

Lifeline Lock, Scaffolding, Swings

American Allsafe Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Safety Tower Ladder Co.
Werner, R. D., Co., Inc.

Lifts, Aerial

Ballymore Co.
Miller Swivel Prod., Inc.
Truck Equip. Co.

Maintenance Towers

Bil-Jax, Inc.
Economy Engineering Co.
Hollaender Mfg. Co.
Patent Scaffolding Co., Inc.
Werner, R. D., Co., Inc.

Manhole Guards, Covers

Bil-Jax, Inc.
Industrial Prod. Co.
Irving Subway Grating Co., Inc.
Magnesium Co. of America
Plastimayd Corp.

Mop Truck

Brulin & Co., Inc.
Finnell System, Inc.
Scientific Industrial Supply Co.

Mowers, Lawn Industrial

Mott Corp.

Nets, Rope Safety

American-LaFrance,
Div. of Sterling Precision Corp.
Bullard, E. D., Co.
Fyr-Fyter Co.
Industrial Prod. Co.
Marryatt-Lane & Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.

Paint, Color Coding

American Marietta Co.
Valdura Div.
Arco Company
Frost Paint and Oil Corp.
Hillyard Chemical Co.
Kelly, The, Paint Co.
Speco, Inc.
Switzer Brothers, Inc.
Truscon Laboratories

Paint, Fluorescent, Safety

Kelly, The, Paint Co.
Lawter Chemicals, Inc.
Minnesota Mining & Mfg. Co.
National Chemsearch Corp.
Prairie State Prod. Co.
Radiant Color Co.
Switzer Brothers, Inc.

Paint, Non-Skid

American Abrasive Metals Co.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Custanite Corp.
Frost Paint and Oil Corp.
Kelly, The, Paint Co.
Magnus Chemical Co., Inc.
Mine Safety Appliances Co.
Miracle Adhesives Corp.
Oil-Dri Corp. of America
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
Tennant, G. H., Co.
Walton-March

Paint, Reflectorized

Kelly, The, Paint Co.
Prairie State Prod. Co.

Parts Cleaning Equipment

Brulin & Co., Inc.
Gunk Laboratories, Inc.
Magnus Chemical Co., Inc.
Oakite Products, Inc.
Practical Mfg. Co.
Wheelabrator Corp.

Platforms, Aerial

Truck Equip. Co.

Platforms, Scaffold

Ballymore Company
Beaver-Advance Corp.
Duo-Safety Ladder Corp.
Hollaender Mfg. Co.
Industrial Prod. Co.
Louisville Ladder Co.
Pendergast, Albert W., Safety Equip. Co.
Safety First Supply Co.
Werner, R. D., Co., Inc.

Platforms, Unloading

Bustin Steel Products, Inc.
Irving Subway Grating Co., Inc.
Magline Inc.
Nichols Engineering Co.

Pole Grip, Safety

American Allsafe Co., Inc.
Boyer Campbell Co.
General Scientific Equip. Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.

Receptacle, Fire Extinguishing, Waste

Rock Royal Corp.

Rope, Safety Marking, Polyethylene

Jay, D., Products Co., Inc.

Safety Device, Tower Ladder

Beaver-Advance Corp.
Bil-Jax, Inc.
Hopfeld Indust. Mfg. Co.
Industrial Prod. Co.
Meyer Machine, Inc.
Rose Mfg. Co.
Werner, R. D., Co., Inc.

Scaffold Jacks

Babcock, W. W., Co., Inc.
Beaver-Advance Corp.
Bil-Jax, Inc.
Louisville Ladder Co.
Patent Scaffolding Co., Inc.
Safety First Supply Co.
Werner, R. D., Co., Inc.

Scaffolding, Rolling

Baker-Roos, Inc.
Beaver-Advance Corp.
Bil-Jax, Inc.
Louisville Ladder Co.
Patent Scaffolding Co., Inc.
Werner, R. D., Co., Inc.

Scaffolding, Safety

Albina Engine & Machine Works
Ballymore Company
Beaver-Advance Corp.
Bil-Jax, Inc.
Bustin Steel Products, Inc.
Louisville Ladder Co.
Patent Scaffolding Co., Inc.
Safety First Supply Co.
Werner, R. D., Co., Inc.

Scrubbing Machines, Floor

American-Lincoln Corp.
Clarke Floor Machine Co.
Doyle Vacuum Cleaner Co.
Finnell System, Inc.
Hild Floor Machine Co., Inc.
Hillyard Chemical Co.
Holt Mfg. Co.
Huntington Laboratories, Inc.
Multi-Clean Products, Inc.
National Chemsearch Corp.
West Chemical Prod., Inc.

Stain Removers, Floor

Associated Just Distributors, Inc.
Brulin & Co., Inc.
Hillyard Chemical Co.
Huntington Laboratories, Inc.
Legge, Walter G., Co., Inc.
Oakite Products, Inc.
Packwood, G. H., Mfg. Co.
Tect, Inc.

Sterilizers, Can Washers

Horizon Industries
Onyx Oil & Chemical Co.

Sterilizing Equipment

Draeger Ox. App. Corp.
Pendergast, Albert W., Safety Equip. Co.
Vacuum Can Co.

Sweepers, Road and Parking Lots

American-Lincoln Corp.
Clarke Floor Machine Co.
Finnell System, Inc.
Handling Devices Co., Inc.
Multifinish Mfg. Co.
Tennant, G. H., Co.

Swing Stages

Babcock, W. W., Co., Inc.
Louisville Ladder Co.
Safety First Supply Co.
Werner, R. D., Co., Inc.

Trestles, Extension

Louisville Ladder Co.
Safety First Supply Co.
Werner, R. D., Co., Inc.

Vacuum Cleaners, Explosion-Proof

American-Lincoln Corp.
Brulin & Co., Inc.
Doyle Vacuum Cleaner Co.
Hild Floor Machine Co., Inc.
Invincible Vacuum Cleaner Mfg. Co.
Multi-Clean Products, Inc.
Spencer Turbine Co.

Vacuum Cleaners, Industrial

American-Lincoln Corp.
Brulin & Co., Inc.
Clarke Floor Machine Co.
Doyle Vacuum Cleaner Co.
Finnell System, Inc.
Handling Devices Co., Inc.
Hild Floor Machine Co., Inc.
Hillyard Chemical Co.
Holt Mfg. Co.
Huntington Laboratories, Inc.
Invincible Vacuum Cleaner Mfg. Co.
M-M-A, Inc.
Multi-Clean Products, Inc.
National Chemsearch Corp.
Spencer Turbine Co.
West Chemical Prod., Inc.

Vacuum Cleaners, Mercury Recovery and Fume Collection

Hild Floor Machine Co., Inc.
New Jersey Safety Equip. Co.
Spencer Turbine Co.

Water Carriers

Dixie Cup Div.
American Can Co.

Wax Applicators, Floor

American-Lincoln Corp.
Brulin & Co., Inc.
Finnell System, Inc.
Hild Floor Machine Co., Inc.
Hillyard Chemical Co.
Huntington Laboratories, Inc.
West Chemical Prod., Inc.

Wax, Floors

American-Lincoln Corp.
Associated Just Distributors, Inc.
Brulin & Co., Inc.
Dameron Enterprises, Inc.
Goodrich, B. F., Footwear & Flooring Co.
Hillyard Chemical Co.
Huntington Laboratories, Inc.
Legge, Walter G., Co., Inc.
Masury-Young Company
Multi-Clean Products, Inc.
National Chemsearch Corp.
Penetone Company
Rochester Germicide Co.
West Chemical Prod., Inc.
Wyandotte Chemicals Corp.

Wiping Towels, Industrial

Institute of Industrial Launderers
Scientific Industrial Supply Co.
West Chemical Prod., Inc.

Workstands, Elevating, Portable & Stationary

Beaver-Advance Corp.
Link-Belt Co.

See directory of Safety Equipment Sources for addresses.

Section 3
Industrial Health Engineering

Air Filters
Advance Glove Mfg. Co.
Allied Witan Co.
Coppus Engineering Corp.
DeVilbiss Co.
Draeger Ox. App. Corp.
Gelman Instrument Co.
Mine Safety Appliances Co.
Standard Glove Co.
Staplex Company,
Air Sampler Div.
Torit Mfg. Co.
Willson Products Div.,
Ray-O-Vac Co.
Wheelabrator Corp.

Air Pollution Control
Buffalo Forge Co.
Detectogas Instruments, Inc.
Draeger Ox. App. Corp.
Gelman Instrument Co.
Leeds & Northrup Co.
Occupational Hygiene Services
Oxy-Catalyst, Inc.
Pangborn Corp.
Staplex Company,
Air Sampler Div.
Stephenson Corp.
Super Vacuum Mfg. Co., Inc.
Torit Mfg. Co.
Wheelabrator Corp.

Anemometers
American Allsafe Co., Inc.
Bacharach Industrial Instrument Co.
Gelman Instrument Co.
Kahl Scientific Instrument Corp.
Willson Products Div.,
Ray-O-Vac Co.

Athlete's Foot Retardant
Dameron Enterprises Inc.
Foam-X Company
Horizon Industries
Industrial Prod. Co.
International Latex Corp.
Karel First Aid Supply Co.
Onox, Inc.
Onyx Oil & Chemical Co.
Rochester Germicide Co.
Standard Glove Co.
West Chemical Prod., Inc.

Blowers, Portable, Electric
Coppus Engineering Corp.
General Scientific Equip. Co.
Mine Safety Appliances Co.
Morrison-Pelsue Co.
Multi-Clean Products, Inc.
Robbins & Myers, Inc.
Ruemelin Mfg. Co.
Super Vacuum Mfg. Co., Inc.

Blowers, Ventilating
Buffalo Forge Co.
Coppus Engineering Corp.
Mine Safety Appliances Co.
Morrison-Pelsue Co.
Robbins & Myers, Inc.
Super Vacuum Mfg. Co., Inc.

Burners, Gas
Coppus Engineering Corp.

Cleaning Compounds or Solvents
Associated Just Distributors, Inc.
Brulin & Co., Inc.
Diamond Alkali Co.
Dow Chemical Co.
DuPont, E. I., de Nemours & Co., Inc.
Fine Organics, Inc.
Finnell System, Inc.
Graymills Corp.
Gunk Laboratories, Inc.
Horizon Industries
Houghton, E. F., & Co.
Huntington Laboratories, Inc.
Legge, Walter G., Co., Inc.
Magnus Chemical Co., Inc.
Masury-Young Company
Miracle Adhesives Corp.
Multi-Clean Products, Inc.
Oakite Products, Inc.
Packwood, G. H., Mfg. Co.
Plasco Safety Products Co.
Practical Mfg. Co.
Rochester Safety Equip. Co., Inc.
Tect, Inc.
Turco Products, Inc.
West Chemical Prod., Inc.
Wyandotte Chemicals Corp.

Deodorizing Appliances
Hillyard Chemical Co.
Huntington Laboratories, Inc.
Karel First Aid Supply Co.
Rochester Germicide Co.

Disinfectant and Deodorants
Associated Just Distributors, Inc.
Brulin & Co., Inc.
Dameron Enterprises, Inc.
DuPont, E. I., de Nemours & Co., Inc.
Halperin, A. E., Co., Inc.
Hillyard Chemical Co.
Horizon Industries
Huntington Laboratories, Inc.
Industrial Prod. Co.
Karel First Aid Supply Co.
Legge, Walter G., Co., Inc.
Multi-Clean Products, Inc.
National Chemsearch Corp.
Oakite Products, Inc.
Onyx Oil & Chemical Co.
Packwood, G. H., Mfg. Co.
Pendergast, Albert W., Safety Equip. Co.
Penetone Company
Rochester Germicide Co.
Scientific Industrial Supply Co.
West Chemical Prod., Inc.
Wyandotte Chemicals Corp.

Dispensers, Foot Spray
Industrial Prod. Co.
Karel First Aid Supply Co.
Onox, Inc.

Dispensers, Protective Ointments
Boyer-Campbell Co.
Chemical Corp.
Karel First Aid Supply Co.
Milburn Company

Dispensers, Salt Tablet
American Allsafe Co., Inc.
Boyer-Campbell Co.
Bullard, E. D., Co.
Central Safety Equip. Co.
Davis Emergency Equip. Co., Inc.
General Scientific Equip. Co.
Halperin, A. E., Co., Inc.
Haws Drinking Faucet Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Medical Supply Co.
Mine Safety Appliances Co.
Morton Salt Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.

Dispensers, Soap
American Allsafe Co., Inc.
Brulin & Co., Inc.
Dameron Enterprises, Inc.
Gojer, Inc.
Hillyard Chemical Co.
Huntington Laboratories, Inc.
Karel First Aid Supply Co.
National Chemsearch Corp.
Packwood, G. H., Mfg. Co.
Rochester Germicide Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Sugar Beet Products Co.
Turco Products, Inc.
West Chemical Prod., Inc.

Drinking Cups, Paper
Dixie Cup Div.,
American Can Co.
Halperin, A. E., Co., Inc.
Karel First Aid Supply Co.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
United States Envelope Co.

Drinking Fountains
Bradley Washfountain Co.
Haws Drinking Faucet Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Taylor, Halsey W., Co.

Drinking Fountains, Portable
American Allsafe Co., Inc.
Haws Drinking Faucet Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Dryers, Face and Hand, Electric
Chicago Hardware Foundry Co.
Huntington Laboratories, Inc.
Industrial Prod. Co.

Dust Arresters
DeVilbiss Co.
Draeger Ox. App. Corp.
Hillyard Chemical Co.
New Jersey Safety Equip. Co.
Pangborn Corp.
Ruemelin Mfg. Co.
Torit Mfg. Co.
Wheelabrator Corp.

Dust Collectors
Buffalo Forge Co.
DeVilbiss Co.
Draeger Ox. App. Corp.
Karel First Aid Supply Co.
Koppers Co., Inc.,
Metal Prod. Div.
Pangborn Corp.
Rochester Safety Equip. Co., Inc.
Ruemelin Mfg. Co.
Torit Mfg. Co.
Wheelabrator Corp.

Dust Control Systems
DeVilbiss Co.
Draeger Ox. App. Corp.
Institute of Industrial Launderers
Pangborn Corp.
Spencer Turbine Co.
Torit Mfg. Co.
Wheelabrator Corp.

Dust Counter
Draeger Ox. App. Corp.
Gelmen Instrument Co.
Industrial Prod. Co.
Kahl Scientific Instrument Corp.
Karel First Aid Supply Co.
Mine Safety Appliances Co.

Dust Suction Equipment
Gelmen Instrument Co.
Ruemelin Mfg. Co.
Spencer Turbine Co.
Torit Mfg. Co.

Dusters, Rock
Mine Safety Appliances Co.

Exhaust Purifiers
Bullard, E. D., Co.
National Mine Service Co.
Oxy-Catalyst, Inc.
Super Vacuum Mfg. Co., Inc.

Eye Washing Fountains
Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Benson & Associates
Boyer-Campbell Co.
General Scientific Equip. Co.
Haws Drinking Faucet Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Logan Emergency Showers, Inc.
Morland Associates
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Speakman Co.
Standard Glove Co.
Standard Safety Equip. Co.
Taylor, Halsey W., Co.

Fans, Exhaust
Buffalo Forge Co.
Coppus Engineering Corp.
DeVilbiss Co.
Robbins & Myers, Inc.
Super Vacuum Mfg. Co., Inc.

Fans, Ventilating
Buffalo Forge Co.
Carey, The Philip, Mfg. Co.
Coppus Engineering Corp.
Morrison-Pelsue Co.
Robbins & Myers, Inc.
Rochester Safety Equip. Co., Inc.
Super Vacuum Mfg. Co., Inc.

Filters, Air Device
Advance Glove Mfg. Co.
Bullard, E. D., Co.
Coppus Engineering Corp.
DeVilbiss Co.
Draeger Ox. App. Corp.
Gelmen Instrument Co.
Mine Safety Appliances Co.
Wheelabrator Corp.

Foot Mats, Disinfecting
Brabrook, A. N., Inc.
Huntington Laboratories, Inc.
Industrial Prod. Co.

Foot Mats, Skin-Toughening
Onox, Inc.
Rochester Safety Equip. Co., Inc.

Fume Collectors
Karel First Aid Supply Co.
Ruemelin Mfg. Co.
Torit Mfg. Co.
Wheelabrator Corp.

Fumigants
Diamond Alkali Co.
Dow Chemical Co.
Huntington Laboratories, Inc.
West Chemical Prod., Inc.

Fungicides
Associated Just Distributors, Inc.
Dow Chemical Co.
Du Pont, E. I. de Nemours & Co., Inc.
Horizon Industries
Huntington Laboratories, Inc.
Karel First Aid Supply Co.
Legge, Walter G., Co., Inc.
Oakite Products, Inc.
Onox, Inc.
Onyx Oil & Chemical Co.
Rochester Germicide Co.
United States Rubber Co.
West Chemical Prod., Inc.

To locate Advertisements, see Advertisers' Index.

Gastester

American Allsafe Co., Inc.
Davis Emergency Equip. Co., Inc.
Detectogas Instruments, Inc.
Draeger Ox. App. Corp.
Johnson-Williams, Inc.
Karel First Aid Supply Co.
Mine Safety Appliances Co.

Germicides

Associated Just Distributors, Inc.
Brulin & Co., Inc.
Dameron Enterprises, Inc.
Dow Chemical Co.
Du Pont, E. I. de Nemours & Co., Inc.
Halperin, A. E., Co., Inc.
Horizon Industries
Huntington Laboratories, Inc.
Industrial Prod. Co.
Karel First Aid Supply Co.
Legge, Walter G., Co., Inc.
National Chemsearch Corp.
Oakite Products, Inc.
Onyx Oil & Chemical Co.
Packwood, G. H., Mfg. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Germicide Co.
West Chemical Prod., Inc.
Willson Products Div.,
Ray-O-Vac Co.
Wyandotte Chemicals Corp.

Hand Cream, Protective

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Ayerst Laboratories
Boyer-Campbell Co.
Brossard, Lester L., Co.
Bullard, E. D., Co.
Cadet Laboratories
Central Safety Equip. Co.
Chemical Corp.
Davis Emergency Equip. Co., Inc.
Du Pont, E. I. de Nemours & Co., Inc.
General Scientific Equip. Co.
Gojer, Inc.
Halperin, A. E., Co., Inc.
Huntington Laboratories, Inc.
Hygiene Research, Inc.
Industrial Prod. Co.
Karel First Aid Supply Co.
Magnus Chemical Co., Inc.
Medical Supply Co.
Milburn Company
Mine Safety Appliances Co.
Packwood, G. H., Mfg. Co.
Plasco Safety Products Co.
Rochester Safety Equip. Co., Inc.
Sahern Products Co.
Safety Clothing & Equip. Co.
Standard Glove Co.
West Chemical Prod., Inc.

Heaters, Ventilating

Buffalo Forge Co.
Electromode,
Div. of Commercial Controls Corp.
Morrison-Pelsue Co.

Herbicides

Allied Chemical Corp.,
General Chemical Div.
Diamond Alkali Co.
Dow Chemical Co.
Du Pont, E. I. de Nemours & Co., Inc.
Geigy Agricultural Chemicals,
Div. of Geigy Chemical Corp.
United States Borax & Chemical Corp.

Hose, Steam

American Biltrite Rubber Co.,
Boston Woven Hose & Rubber Div.
Goodall Rubber Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Snyder, M. L., & Son, Inc.
United States Rubber Co.

Insecticides

Allied Chemical Corp.,
General Chemical Div.
Aluminum Co. of America
Associated Just Distributors, Inc.
Brulin & Co., Inc.
Bullard, E. D., Co.
Diamond Alkali Co.
Dow Chemical Co.
Du Pont, E. I. de Nemours & Co., Inc.
Geigy Agricultural Chemicals,
Div. of Geigy Chemical Corp.
Halperin, A. E., Co., Inc.
Huntington Laboratories, Inc.
Karel First Aid Supply Co.
National Chemsearch Corp.
Rochester Germicide Co.
United States Rubber Co.
West Chemical Prod., Inc.

Lockers and Hangers for Clothing

Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Salt Tablets

American Allsafe Co., Inc.
Boyer-Campbell Co.
Bullard, E. D., Co.
Davis Emergency Equip. Co., Inc.
General Scientific Equip. Co.
Halperin, A. E., Co., Inc.
Industrial Prod. Co.
Karel First Aid Supply Co.
Medical Supply Co.
Mine Safety Appliances Co.
Morton Salt Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.

Sand Blast Equipment

Bullard, E. D., Co.
Draeger Ox. App. Corp.
Industrial Gloves Co.
Industrial Prod. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Safety Clothing & Equip. Co.
Standard Glove Co.
Wheelabrator Corp.

Shower Baths, Industrial

Bradley Washfountain Co.
Huntington Laboratories, Inc.
Logan Emergency Showers, Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Speakman Co.

Showers, Emergency

American Allsafe Co., Inc.
Benson & Associates
General Scientific Equip. Co.
Haws Drinking Faucet Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Kewaunee Mfg. Co.
Logan Emergency Showers, Inc.
Morland Associates
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Speakman Co.
Standard Safety Equip. Co.

Showers, Laboratory

American Allsafe Co., Inc.
General Scientific Equip. Co.
Karel First Aid Supply Co.
Logan Emergency Showers, Inc.
Morland Associates
Speakman Co.

Soaps or Cleaners, Hand

American Allsafe Co., Inc.
Brulin & Co., Inc.
Chemical Corp.
Dameron Enterprises, Inc.
Dolge, C. B., Co.
Finnell System, Inc.
Gojer, Inc.
Halperin, A. E., Co., Inc.
Hillyard Chemical Co.
Huntington Laboratories, Inc.
Karel First Aid Supply Co.
Lightfoot Co., Inc.
Magnus Chemical Co., Inc.
Milburn Company
Mine Safety Appliances Co.
National Chemsearch Corp.
Oakite Products, Inc.
Packwood, G. H., Mfg. Co.
Penetone Company
Rochester Germicide Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Standard Glove Co.
Sugar Beet Products Co.
Turco Products, Inc.
West Chemical Prod., Inc.

Solvents, Cleaning and Safety

Brulin & Co., Inc.
Dolge, C. B., Co.
Diamond Alkali Co.
Dow Chemical Co.
DuPont, E. I., de Nemours & Co., Inc.
Finnell System, Inc.
Graymills Corp.
Karel First Aid Supply Co.
Legge, Walter G., Co., Inc.
Magnus Chemical Co., Inc.
Miracle Adhesives Corp.
National Chemsearch Corp.
New Jersey Safety Equip. Co.
Oakite Products, Inc.
Penetone Company
Practical Mfg. Co.
Rochester Safety Equip. Co., Inc.
Speco, Inc.
Tect, Inc.
Turco Products, Inc.

Toilet Plunger

Stevens-Burt Co.

Towels, Paper

Huntington Laboratories, Inc.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
West Chemical Prod., Inc.

Vending Machines, Sanitary Napkins

Halperin, A. E., Co., Inc.
Karel First Aid Supply Co.
Rochester Germicide Co.
Scientific Industrial Supply Co.
West Chemical Prod., Inc.

Ventilating Devices, Portable

Coppus Engineering Corp.
Mine Safety Appliances Co.
Morrison-Pelsue Co.
Robbins & Myers, Inc.
Super Vacuum Mfg. Co., Inc.

Ventilating Equipment

American Brattice Cloth Corp.
Buffalo Forge Co.
Carey, The Philip, Mfg. Co.
Coppus Engineering Corp.
Morrison-Pelsue Co.
Robbins & Myers, Inc.
Super Vacuum Mfg. Co., Inc.
Wasco Products, Inc.

Washfountains

Bradley Washfountain Co.
Industrial Prod. Co.
Speakman Co.

Washroom Equipment, Industrial

Bradley Washfountain Co.
Carey, The Philip, Mfg. Co.
Rochester Germicide Co.
Speakman Co.

Washstations, Waterless

Dameron Enterprises, Inc.
Rochester Safety Equip. Co., Inc.
Sugar Beet Products Co.

Water Coolers

Haws Drinking Faucet Co.
Karel First Aid Supply Co.
Rochester Safety Equip. Co., Inc.
Taylor, Halsey W., Co.

Water Coolers, Explosion Proof

Haws Drinking Faucet Co.
Taylor, Halsey W., Co.

Section 4
Noise Control

Audiometers

Beltone Hearing Aid Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Maico Electronics, Inc.
Union Industrial Equip. Corp.
Willson Industrial Safety Equip.

Audiometric Testing Rooms

Hansson, Elof, Inc.
Industrial Acoustics Co., Inc.
Karel First Aid Supply Co.
Koppers Co., Inc.
Metals Prod. Div.
Maico Electronics, Inc.
Rysdon Products Co.,
Noise Control Div.

Blast Recorder

Geotechnical Corp.

Ear Stopples

American Allsafe Co., Inc.
Boyer-Campbell Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Maico Electronics, Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sigma Engineering Co.
Standard Glove Co.
Surgical Mechanical Research, Inc.

Hearing Aids

Beltone Hearing Aid Co.
Maico Electronics, Inc.

Hearing Protectors

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Clark, David, Co., Inc.
Genter, C. D., Co.
Gentex Corp.
Mine Safety Appliances Co.

See directory of Safety Equipment Sources for addresses.

New Jersey Safety Equip. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Sigma Engineering Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Industrial Sound Control

Boyer-Campbell Co.
Hansson, Elof, Inc.
Industrial Acoustics Co., Inc.
Johns-Manville Sales Corp.
Koppers Co., Inc.
Metal Prod. Div.
Midwest Audio Corp.
Morland Associates
Osborn Mfg. Corp.
Rysdon Products Co.
Noise Control Div.
Willson Industrial Safety Equip.

Meter, Sound-Survey

General Radio Co.
Mine Safety Appliances Co.
Scott, H. H., Inc.
Instrument Div.
Union Industrial Equip. Corp.

Noise Control

Allied Witan Co.
Hansson, Elof, Inc.
Industrial Acoustics Co., Inc.
Johns-Manville Sales Corp.
Osborn Mfg. Corp.
Rysdon Products Co.,
Noise Control Div.
Safety Ear Protector Co.
Union Industrial Equip. Corp.

Protectors, Ear

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Clark, David, Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Gentex Corp.
Industrial Prod. Co.
International Latex Corp.
Maico Electronics, Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Protecto Ear Plugs, Inc.
Rochester Safety Equip. Co., Inc.
Safety Ear Protector Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Sigma Engineering Co.
Surgical Mechanical Research, Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Sound Absorbers

Allied Witan Co.
Goodall Rubber Co.
Hansson, Elof, Inc.
Industrial Acoustics Co., Inc.
Industrial Prod. Co.
Rose Mfg. Co.
Rysdon Products Co.,
Noise Control Div.

Sound Analyzers

General Radio Co.
Midwest Audio Corp.
Mine Safety Appliances Co.
Scott, H. H., Inc.,
Instrument Div.

Sound Control Panels

Hansson, Elof, Inc.
Industrial Acoustics Co., Inc.
Johns-Manville Sales Corp.
Koppers Co., Inc.,
Metal Prod. Div.
Midwest Audio Corp.
Rose Mfg. Co.
Rysdon Products Co.,
Noise Control Div.
Scott, H. H., Inc.,
Instrument Div.

Sound Protectors, Ear Muff

American Allsafe Co., Inc.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Clark, David, Co., Inc.
Genter, C. D., Co.
Gentex Corp.
Industrial Prod. Co.
International Latex Corp.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rysdon Products Co.,
Noise Control Div.
Willson Prod. Div.,
Ray-O-Vac Co.

Section 5
Personal Protection—Part 1

Anti-Fogging Compounds for Goggles

Acme Protection Equip. Co.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Carhoff Co.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
International Latex Corp.
Karel First Aid Supply Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Opticase Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Silicone Paper Co. of America, Inc.
Standard Glove Co.
Wilkins Co., Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Anti-Fogging Cloth for Glasses, Windshields (Anti-Fogging Compounds)

American Allsafe Co., Inc.
Bausch & Lomb Optical Co.
Carhoff Co.
Genter, C. D., Co.
Hygiene Research, Inc.
Industrial Prod. Co.
International Latex Corp.
Kimball Safety Prod. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Standard Glove Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Blowers, Hose Mask

Acme Protection Equip. Co.
American Allsafe Co., Inc.
Bullard, E. D., Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Genter, C. D., Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Breathing Apparatus, Air Supplied

Acme Protection Equip. Co.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Fisher Scientific Co.
Fyr-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Globe Industries, Inc.,
Special Prod. Div.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scott Aviation Corp.
Standard Glove Co.
Stephenson Corp.
Willson Industrial Safety Equip.

Caps, Skull

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Eastern Safety Equip. Co., Inc.
Fashion Seal Uniforms
Genter, C. D., Co.
Gentex Corp.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Spaulding Fibre Co., Inc.
Standard Glove Co.
Wheeler Protective Apparel, Inc.
Willson Industrial Safety Equip.

Caps, Women's

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Boyer-Campbell Co.
David's Gloves, Inc.
Eastern Safety Equip. Co., Inc.
Fashion Seal Uniforms
General Scientific Equip. Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Millburn Company
Pendergast, Albert W., Safety Equip. Co.
Plasco Safety Products Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
United States Rubber Co.

Cases, Spectacle, Goggle and Sun Glasses

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Eastern Safety Equip. Co., Inc.
Fendall Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Opticase Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Wilkie Optical Inc.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Cleaning Tissues, Lens, Silicone

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Carhoff Co.
Dow Corning Corp.
Eastern Safety Equip. Co., Inc.
Fisher Scientific Co.
General Scientific Equip. Co., Inc.
Genter, C. D., Co.
Karel First Aid Supply Co.
Kimball Safety Prod. Co.
Lensclean, Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Silicone Paper Co. of America, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Wilkie Optical Inc.

Cleaning Tissues, Goggles

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Carhoff Co.
Dow Corning Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
International Latex Corp.
Karel First Aid Supply Co.
Kimball Safety Prod. Co.
Lensclean, Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Silicone Paper Co. of America, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.
Wilkie Optical Inc.
Wilkins Co., Inc.

Cover Lens

Air Reduction Sales Co.
American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Dickson Corp.
Eastern Safety Equip. Co., Inc.
Fendall Co.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Kedman Company
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Pioneer Scientific Corp.
Sub. of Bausch & Lomb Optical Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Welsh Mfg. Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Dispensers, Goggle and Spectacle Cleaners

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.

To locate Advertisements, see Advertisers' Index.

classified safety products index

(section 5—continued)

Boyer-Campbell Co.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
International Latex Corp.
Karel First Aid Supply Co.
Kimball Safety Prod. Co.
Lensclean, Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Silicone Paper Co. of America, Inc.
Standard Glove Co.
United States Safety Service Co.
Wilkins Co., Inc.

Eyeglass, Holder

American Allsafe Co., Inc.
Eastern Safety Equip. Co., Inc.
Genter, C. D., Co.
Industrial Gloves Co.
Rochester Safety Equip. Co., Inc.
Seron Mfg. Co.
Standard Glove Co.

Eye Shades, Non-Flammable

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
Chicago Eye Shield Co.
Eastern Safety Equip. Co., Inc.
Fisher Scientific Co.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.

Eye Shields

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Dockson Corp.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
Fisher Scientific Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Jackson Products
Jones & Company
Kedman Company
Kerreo Products
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Plasco Safety Products Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.
Welsh Mfg. Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Eyesight Surveys

Glendale Optical Co., Inc.
Rochester Safety Equip. Co., Inc.
Sellstrom Mfg. Co.
Standard Glove Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Face Shields

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Bullard, E. D., Co.
Chicago Eye Shield Co.
Dockson Corp.
Dunn Products
Eastern Safety Equip. Co., Inc.
Fendall Co.
Fibre-Metal Prod. Co.
Fisher Scientific Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Jackson Products
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Plasco Safety Products Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Spaulding Fibre Co., Inc.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Welsh Mfg. Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Glass, Safety

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Dockson Corp.
Eastern Safety Equip. Co., Inc.
Fendall Co.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Kedman Company
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Welsh Mfg. Co.
Wilkie Optical Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Glass, Welding Plates and Lenses

Air Reduction Sales Co.
American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Dockson Corp.
Eastern Safety Equip. Co., Inc.
Fendall Co.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Kedman Company
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First, Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Welsh Mfg. Co.
Wilkie Optical Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Goggles and Spectacle Cleaners

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Carhoff Co.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
International Latex Corp.
Kimball Safety Prod. Co.
Lensclean, Inc.
Mine Safety Appliances Co.
Opticase Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.
Wilkins Co., Inc.

Goggles

Air Reduction Sales Co.
American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Cover, H. S., Co.
Dockson Corp.
Eastern Safety Equip. Co., Inc.
Fendall Co.
Fibre-Metal Prod. Co.
Fisher Scientific Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Jackson Products
Jones & Company
Kedman Company
Kerreo Products
Kimball Safety Prod. Co.
Linde Company,
Div. of Union Carbide Corp.
Mine Safety Appliances Co.
National Mine Service Co.
New Jersey Safety Equip. Co.
Plasco Safety Products Co.
Progress Industries
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
Titmus Optical Co., Inc.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Welsh Mfg. Co.
Wilkie Optical Inc.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Hair Guards

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Associated Bag & Apron Co.
Boyer-Campbell Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.

Hat Liners

Air Reduction Sales Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
Associated Bag & Apron Co.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Gentex Corp.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Jackson Products
Jomac Inc.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Spaulding Fibre Co., Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Hats and Caps, Safety

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
Air Reduction Sales Co.
Bashlin, W. M., Co.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Bullard, E. D., Co.
Chic-Maid Hat Mfg. Co., Inc.
Davis Emergency Equip. Co., Inc.
Dockson Corp.
Eastern Safety Equip. Co., Inc.
Fashion Seal Uniforms
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Gentex Corp.
Goodall Rubber Co.
Industrial Prod. Co.
Jackson Products
Johns-Manville Sales Corp.
Kennedy-Ingalls, Inc.
Milburn Company
Mine Safety Appliances Co.
National Mine Service Co.
New Jersey Safety Equip. Co.
Plasco Safety Products Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Spaulding Fibre Co., Inc.
Standard Glove Co.
Standard Safety Equip. Co.
United States Safety Service Co.
Welsh Mfg. Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Helmets, Firemen's

Boyer-Campbell Co.
Bullard, E. D., Co.
Fibre-Metal Prod. Co.
Fyrepel Products, Inc.
Fyr-Fyter Co.
Genter, C. D., Co.
Gentex Corp.
Goodall Rubber Co.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

See directory of Safety Equipment Sources for addresses.

Helmets, Sandblast

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Bullard, E. D., Co.
Chicago Eye Shield Co.
Draeger Ox. App. Corp.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Gentex Corp.
Industrial Gloves Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pangborn Corp.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
United States Rubber Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Helmets, Welding

Air Reduction Sales Co.
American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Bullard, E. D., Co.
Chicago Eye Shield Co.
Dockson Corp.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
Fyrepel Products, Inc.
General Scientific Equip Co.
Genter, C. D., Co.
Industrial Prod. Co.
Jackson Products
Kedman Company
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Spaulding Fibre Co., Inc.
Standard Glove Co.
Welsh Mfg. Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Holder, Safety Spectacles

American Allsafe Co., Inc.
Boyer-Campbell Co.
Eastern Safety Equip. Co., Inc.
Genter, C. D., Co.
Industrial Gloves Co.
Rochester Safety Equip. Co., Inc.
Sellstrom Mfg. Co.
Serom Mfg. Co.
Standard Glove Co.

Hoods, Acid

Acme Protection Equip. Co.
Advance Glove Mfg. Co.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Bullard, E. D., Co.
Chicago Eye Shield Co.
Fashion Seal Uniforms
Fibre-Metal Prod. Co.
Fisher Scientific Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Jomac Inc.
Kewaunee Mfg. Co.
Kimball Safety Prod. Co.
Milburn Company
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Union Industrial Equip. Corp.
Wheeler Protective Apparel, Inc.

Hoods, Dust

Acme Protection Equip. Co.
Advance Glove Mfg. Co.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Bullard, E. D., Co.
Chicago Eye Shield Co.
DeVilbiss Co.
Eastern Safety Equip. Co., Inc.
Fisher Scientific Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Milburn Company
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Plasco Safety Products Co.
Plastimayd Corp.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Hoods, Enamelers'

Advance Glove Mfg. Co.
American Optical Co.
Safety Products Div.
Boyer-Campbell Co.
DeVilbiss Co.
Dockson Corp.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.

Hoods, Insulator

Advance Glove Mfg. Co.
Genter, C. D., Co.
Kennedy-Ingalls, Inc.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Salisbury, W. H., & Co.

Indicators, Oxygen Deficiency

Davis Emergency Equip. Co., Inc.
Detectogas Instruments, Inc.
General Scientific Equip. Co.
Genter C. D., Co.
Mine Safety Appliances Co.
National Mine Service Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Stephenson Corp.

Inhalators

American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Emerson, J. H., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Stephenson Corp.

Lens, Industrial

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Dockson Corp.
Eastern Safety Equip. Co., Inc.
Fendall Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Jones & Company
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Pioneer Scientific Corp.
Sub. of Bausch & Lomb Optical Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Sager Glove Corp.
Sellstrom Mfg. Co.
Standard Glove Co.
Titmus Optical Co., Inc.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Welsh Mfg. Co.
Wilkie Optical Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Lens, Inspection

Bausch & Lomb Optical Co.
Boyer-Campbell Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Luxo Lamp Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Standard Glove Co.
Watchemoket Optical Co., Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Lens, Prescription

American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Eastern Safety Equip. Co., Inc.
Fendall Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Pioneer Scientific Corp.,
Sub. of Bausch & Lomb Optical Co.
Rochester Safety Equip. Co., Inc.
Sellstrom Mfg. Co.
Standard Glove Co.
Titmus Optical Co., Inc.
United States Safety Service Co.
Wilkie Optical Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Magnifiers

American Allsafe Co., Inc.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Karel First Aid Supply Co.
Luxo Lamp Corp.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sellstrom Mfg. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Mask, Abrasive Blasting

American Industrial Safety Equip. Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Masks, Acid Gas

Acme Protection Equip. Co.
Boyer-Campbell Co.
Bullard, E. D., Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Synder, M. I., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Willson Prod. Div.
Ray-O-Vac Co.

Masks, All-Service

Acme Protection Equip. Co.
American LaFrance,
Div. of Sterling Precision Corp.
Boyer-Campbell Co.
Bullard, E. D., Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
Fyr-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Masks, Ammonia Gas

Acme Protection Equip. Co.
American LaFrance,
Div. of Sterling Precision Corp.
Boyer-Campbell Co.
Bullard, E. D., Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

To locate Advertisements, see Advertisers' Index.

classified safety products index

(section 5—continued)

Masks, Babbitting

Boyer-Campbell Co.
Chicago Eye Shield Co.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Standard Glove Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Masks, Carbon Monoxide

Acme Protection Equip. Co.
Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Masks, Gas, Welding

Acme Protection Equip. Co.
Air Reduction Sales Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Masks, Hose (Fresh Air)

Acme Protection Equip. Co.
Boyer-Campbell Co.
Bullard, E. D., Co.
Chicago Eye Shield Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
Genter, C. D., Co.
Globe Industries, Inc.,
Special Prod. Div.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Standard Glove Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Masks, Hose (Supplied Air)

Acme Protection Equip. Co.
Boyer-Campbell Co.
Bullard, E. D., Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
Genter, C. D., Co.
Globe Industries, Inc.,
Special Prod. Div.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scott Aviation Corp.

Masks, Organic Vapor

Acme Protection Equip. Co.
Boyer-Campbell Co.
Bullard, E. D., Co.
Chicago Eye Shield Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Oxygen Breathing Apparatus

American LaFrance,
Div. of Sterling Precision Corp.
Boyer-Campbell Co.
Draeger Ox. App. Corp.
Fisher Scientific Co.
Fyr-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Globe Industries, Inc.,
Special Prod. Div.
Halprin Supply Co.
Karel First Aid Supply Co.
Linde Company,
Div. of Union Carbide Corp.
Mine Safety Appliances Co.
Monaghan, J. J., Co., Inc.
New Jersey Safety Equip. Co.
Oxy-Swig, Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Stephenson Corp.
Willson Industrial Safety Equip.

Oxygen Recorders

Davis Emergency Equip. Co., Inc.
Leeds & Northrup Co.
Mine Safety Appliances Co.
Stephenson Corp.

Rescue Apparatus, Diving and Underwater

American Industrial Safety Equip. Co.
Draeger Ox. App. Corp.
Genter, C. D., Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scott Aviation Corp.

Respirators, Air-Line

Acme Protection Equip. Co.
American Allsafe Co., Inc.
American Optical Co.
Safety Products Div.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
Fyr-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Globe Industries, Inc.,
Special Prod. Div.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pangborn Corp.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scott Aviation Corp.
Standard Glove Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Respirators, Dust, Acid Fume, Smoke

American Allsafe Co., Inc.
American Optical Co.
Safety Products Div.
Boyer-Campbell Co.
Draeger Ox. App. Corp.
Dunn Products
Eastern Safety Equip. Co., Inc.
Fisher Scientific Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Scientific Industrial Supply Co.
Synder, M. L., & Son, Inc.
Standard Safety Equip. Co.
Willson Industrial Safety Equip.
Willson Prod. Div.,
Ray-O-Vac Co.

Respirators, Dust-Type A

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.
Safety Products Div.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Cover, H. S., Co.
DeVilbiss Co.
Draeger Ox. App. Corp.
Dunn Products
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Halprin Supply Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
National Mine Service Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sellstrom Mfg. Co.
Standard Safety Equip. Co.
Watchemoket Optical Co., Inc.
Welsh Mfg. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Respirators, Dust-Type A and Lead-Combination

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Cover, H. S., Co.
DeVilbiss Co.
Draeger Ox. App. Corp.
Dunn Products
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sellstrom Mfg. Co.
Standard Safety Equip. Co.
Welsh Mfg. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Respirators, Dust-Lead

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Chicago Eye Shield Co.
DeVilbiss Co.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Welsh Mfg. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Respirators, Fume

American Allsafe Co., Inc.
American Optical Co.
Safety Products Div.
Boyer-Campbell Co.
DeVilbiss Co.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Sellstrom Mfg. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Respirators, Gas

American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Respirators, Mists

American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
DeVilbiss Co.
Draeger Ox. App. Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Standard Glove Co.

See directory of Safety Equipment Sources for addresses.

Sellstrom Mfg. Co.
Welsh Mfg. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Spectacles, Industrial

American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Chicago Eye Shield Co.
Dockson Corp.
Eastern Safety Equip. Co., Inc.
Fendall Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
National Mine Service Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
Titmus Optical Co., Inc.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Welsh Mfg. Co.
Wilkie Optical Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Sun Glasses

American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Eastern Safety Equip. Co., Inc.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Industrial Prod. Co.
Pioneer Scientific Corp.
Sub. of Bausch & Lomb Optical Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Titmus Optical Co., Inc.
Watchemoket Optical Co., Inc.
Willson Prod. Div.,
Ray-O-Vac Co.

Sweat Bands

Allied Glove Corp.
American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co.
Safety Products Div.
Associated Bag & Apron Co.
Boyer-Campbell Co.
Bullard, E. D., Co.
David's Gloves, Inc.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
General Bandages, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Glendale Optical Co., Inc.
Halperin, A. E., Co., Inc.
Industrial Gloves Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.

Vision Testing Equipment

American Optical Co.,
Safety Products Div.
Bausch & Lomb Optical Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Keystone View Co.
Titmus Optical Co., Inc.

Section 6
Personal Protection—Part 2

Aprons

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Associated Bag & Apron Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Charleston Rubber Co.
Chicago Eye Shield Co.
David's Gloves, Inc.
Dunn Products
Eastern Safety Equip. Co., Inc.
Erell Mfg. Co.
Fashion Seal Uniforms
Fisher Scientific Co.
Frommelt Industries
Fyrepel Products, Inc.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Institute of Industrial Launderers
Johns-Manville Sales Corp.
Jomac Inc.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Milburn Company
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Plaseo Safety Products Co.
Plastimayd Corp.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Setlow, M., & Son, Inc.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Surety Rubber Co.
United States Rubber Co.
United States Safety Service Co.
West Chemical Prod., Inc.
Wheeler Protective Apparel, Inc.
Worklon, Inc.

Aprons, Metal Mesh

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.

Automobile Safety Belts

American Allsafe Co., Inc.
Boyer-Campbell Co.
Bullard, E. D., Co.
Custom Crown Sales Co.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Safety Clothing & Equip. Co.

Bags, Linemen's Glove

Advance Glove Mfg. Co.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Charleston Rubber Co.
Davis Emergency Equip. Co., Inc.
Dorsey, John E., Co.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Jomac Inc.
Kennedy-Ingalls, Inc.
Klein, Mathias, & Sons, Inc.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Plastimayd Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Salisbury, W. H., & Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Surety Rubber Co.

Bags, Linemen's Sleeve

Advance Glove Mfg. Co.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Charleston Rubber Co.
Davis Emergency Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Jomac Inc.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Plastimayd Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Salisbury, W. H., & Co.
Standard Glove Co.
Surety Rubber Co.

Belt Shock Absorbers

American Allsafe Co., Inc.
Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.

Belts, Linemen's

American Allsafe Co., Inc.
Atlas Safety Equip. Co., Inc.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H. ,Co.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Industrial Safety Belt Co.
Klein, Mathias, & Sons, Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.

Belts, Safety

American Allsafe Co., Inc.
Atlas Safety Equip. Co., Inc.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Bullard, E. D., Co.
Custom Crown Sales Co.
Davis Emergency Equip. Co., Inc.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Gentex Corp.
Halprin Supply Co.
Industrial Prod. Co.
Industrial Safety Belt Co.
Kennedy-Ingalls, Inc.
Klein, Mathias, & Sons, Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.

Blankets, Fireproofed

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div
Associated Bag & Apron Co.
Boyer-Campbell Co.
Bullard, E. D., Co.
Davis Emergency Equip. Co., Inc.
Eastern Safety Equip. Co., Inc.
Frommelt Industries
Fyrepel Products, Inc.
Fyr-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Halperin, A. E., Co., Inc.
Halprin Supply Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Johns-Manville Sales Corp.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Blankets, Linemen's Plastic

Aljay Mfg. Co., Inc.
Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Midwest Glove Co., Inc.
Plastimayd Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Blankets, Linemen's Rubber

American Allsafe Co., Inc.
Boyer-Campbell Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Prod. Co.
Midwest Glove Co., Inc.
Rochester Safety Equip. Co., Inc.

To locate Advertisements, see Advertisers' Index.

Safety First Supply Co.
Salisbury, W. H., & Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Surety Rubber Co.

Blankets, Wool Safety

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Junkin Safety Appliance Co., Inc.
Karel First Aid Supply Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Boot Liners

Boyer-Campbell Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Iron Age Safety Shoe Div., H. Childs & Co., Inc.
Jomac Inc.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Boots, Linemen's

Bashlin, W. M., Co.
Boyer-Campbell Co.
Dorsey, John E., Co.
Genter, C. D., Co.
Goodall Rubber Co.
Hy-Test Safety Shoes, Div. International Shoe Co.
Industrial Prod. Co.
Lehigh Safety Shoe Co.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Wolverine Shoe & Tanning Corp.

Boots, Neoprene

Allied Glove Corp.
American Allsafe Co., Inc.
Boyer-Campbell Co.
David's Gloves, Inc.
Dunn Products
Genter, C. D., Co.
Goodall Rubber Co.
Goodrich, B. F., Footwear & Flooring Co.
Hood Rubber Products
Hy-Test Safety Shoes, Div. International Shoe Co.
Industrial Prod. Co.
Iron Age Safety Shoe Div., H. Childs & Co., Inc.
Lehigh Safety Shoe Co.
Midwest Glove Co., Inc.
New Jersey Safety Equip. Co.
Plasco Safety Products Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Tingley Rubber Corp.

Boots, Rubber

Allied Glove Corp.
American Allsafe Co., Inc.
Beacon Falls Rubber Footwear
Boyer-Campbell Co.
David's Gloves, Inc.
Dorsey, John E., Co.
Dunn Products
Fyr-Fyter Co.
Genter, C. D., Co.
Goodall Rubber Co.
Goodrich, B. F., Footwear & Flooring Co.
Halprin Supply Co.
Hood Rubber Products
Industrial Prod. Co.
Iron Age Safety Shoe Div., H. Childs & Co., Inc.
Lehigh Safety Shoe Co.
Midwest Glove Co., Inc.
Plasco Safety Products Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Tingley Rubber Corp.
United States Rubber Co.

Boots, Safety Toe

American Allsafe Co., Inc.
Beacon Falls Rubber Footwear
Boyer-Campbell Co.
Bronson Shoe Co.
Dunn Products
Genter, C. D., Co.
Goodall Rubber Co.
Goodrich, B. F., Footwear & Flooring Co.
Halprin Supply Co.
Haus of Krause
Hood Rubber Products
Hy-Test Safety Shoes, Div. International Shoe Co.
Industrial Prod. Co.
Iron Age Safety Shoe Div., H. Childs & Co., Inc.
Johns-Manville Sales Corp.
Lehigh Safety Shoe Co.
Midwest Glove Co., Inc.
Plasco Safety Products Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Safety First Shoe Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Wolverine Shoe & Tanning Corp.

Boots, Wooden Sole

Boyer-Campbell Co.
Fyrepel Products, Inc.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Prod. Co.
Midwest Glove Co., Inc.
New Jersey Safety Equip. Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.

Canvas, Fireproofed

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
Buhrke, R. H., Co.
Flash Shield Products
Frommelt Industries
Fry-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Lynrus Finishing Co., Inc.
Midwest Glove Co., Inc.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Climbers, Linemen's

American Allsafe Co., Inc.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Klein, Mathias, & Sons, Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Standard Glove Co.

Cloth, Asbestos

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Cordo Chemical Corp.
Dunn Products
Flash Shield Products
Frommelt Industries
Fyrepel Products, Inc.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Johns-Manville Sales Corp.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Raybestos-Manhattan, Inc., Asbestos Textile Div.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
United States Rubber Co.
Wheeler Protective Apparel, Inc.

Cloth, Coated, Safety

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Charleston Rubber Co.
Cordo Chemical Corp.
Flash Shield Products
Frommelt Industries
Genter, C. D., Co.
Herculite Protective Fabrics
Industrial Gloves Co.
Industrial Prod. Co.
Jomac Inc.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Raybestos-Manhattan, Inc., Asbestos Textile Div.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Standard Glove Co.
Union Industrial Equip. Corp.
United States Rubber Co.
Wheeler Protective Apparel, Inc.

Clothing, Acid Resistant

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
American Optical Co., Safety Products Div.
Barnett, Art, Uniform Co.
Boyer-Campbell Co.
Charleston Rubber Co.
Chrysler Textiles Inc., Industratex Div.
Dunn Products
Fashion Seal Uniforms
Fisher Scientific Co.
Fyrepel Products, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Institute of Industrial Launderers
Jomac Inc.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Milburn Company
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Plasco Safety Products Co.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Safety Clothing & Equip. Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Setlow, M., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.
Worklon, Inc.

Clothing, Aluminized

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
American LaFrance, Div. of Sterling Precision Corp.
American Optical Co., Safety Products Div.
Boyer-Campbell Co.
Dunn Products
Frommelt Industries
Fyrepel Products, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Clothing, Fireproofed

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
American Optical Co., Safety Products Div.
Boyer-Campbell Co.
Dunn Products
Fyrepel Products, Inc.
Fyr-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Institute of Industrial Launderers
Johns-Manville Sales Corp.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Lynrus Finishing Co., Inc.
Midwest Glove Co., Inc.
Milburn Company
Mine Safety Appliances Co.
Minnesota Minning & Mfg. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Plastimayd Corp.

See directory of Safety Equipment Sources for addresses.

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Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
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Scientific Industrial Supply Co.
Setlow, M., & Son, Inc.
Singer Glove Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
Wamsutta-Pacific Industrial Div., M. Lowenstein & Sons, Inc.
Wheeler Protective Apparel, Inc.

Clothing, Industrial

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
Barnett, Art, Uniform Co.
Beacon Falls Rubber Footwear
Boyer-Campbell Co.
Charleston Rubber Co.
Dunn Products
Fashion Seal Uniforms
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Institute of Industrial Launderers
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Midwest Glove Co., Inc.
Milburn Company
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New Jersey Safety Equip. Co.
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Plasco Safety Products Co.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Safety Clothing & Equip. Co.
Sager Glove Corp.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.
Setlow, M., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.
Worklon, Inc.

Clothing, Leather

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co., Safety Products Div.
Boyer-Campbell Co.
Dunn Products
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
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New Jersey Safety Equip. Co.
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Plasco Safety Products Co.
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Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Clothing, Linemen's

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Optical Co., Safety Products Div.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Dorsey, John E., Co.
Dunn Products
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
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New Jersey Safety Equip. Co.
Plastimayd Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.

Clothing, Lint-Free

Worklon, Inc.

Clothing, Plastic

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Associated Bag & Apron Co.
Beacon Falls Rubber Footwear
Boyer-Campbell Co.
Charleston Rubber Co.
Davis Emergency Equip. Co., Inc.
Dunn Products
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Jomac Inc.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Milburn Company
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Pendergast, Albert W., Safety Equip. Co.
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Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
United States Rubber Co.

Clothing, Protective

Advance Glove Mfg. Co.
Air Reduction Sales Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co., Safety Products Div.
Associated Bag & Apron Co.
Beacon Falls Rubber Footwear
Boyer-Campbell Co.
Charleston Rubber Co.
Clark, David, Co., Inc.
Dunn Products
Fisher Scientific Co.
Fyrepel Products, Inc.
Fyr-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Halprin Supply Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Jomac Inc.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
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Pendergast, Albert W., Safety Equip. Co.
Plasco Safety Products Co.
Plastimayd Corp.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Union Industrial Equip. Corp.
United States Rubber Co.
Wamsutta-Pacific Industrial Div., M. Lowenstein & Sons, Inc.
Wheeler Protective Apparel, Inc.
Worklon, Inc.

Clothing, Rubber

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Barnett, Art, Uniform Co.
Beacon Falls Rubber Footwear
Boyer-Campbell Co.
Charleston Rubber Co.
Dorsey, John E., Co.
Dunn Products
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Halprin Supply Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pioneer Rubber Co.
Plasco Safety Products Co.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
United States Rubber Co.

Clothing, Static-Free

Worklon, Inc.

Clothing, Weatherproof

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
American Optical Co., Safety Products Div.
Barnett, Art, Uniform Co.
Bashlin, W. M., Co.
Beacon Falls Rubber Footwear
Boyer-Campbell Co.
Dorsey, John E., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Prod. Co.
Jomac Inc.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Milburn Company
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Plastimayd Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Synder, M. L., & Son, Inc.
Standard Glove Co.
United States Rubber Co.
Wheeler Protective Apparel, Inc.

Clothing, Women Workers'

Advance Glove Mfg. Co.
Barnett, Art, Uniform Co.
Charleston Rubber Co.
Fashion Seal Uniforms
Genter, C. D., Co.
Industrial Prod. Co.
Institute of Industrial Launderers
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Milburn Company
Mine Safety Appliances Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Worklon, Inc.

Cots, Finger

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co. Safety Products Div.
Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Dunn Products
Fisher Scientific Co.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Halperin, A. E., Co., Inc.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Kennedy-Ingalls, Inc.
Medical Supply Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Plasco Safety Products Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Curtains, Fireproofed

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
Associated Bag & Apron Co.
Boyer-Campbell Co.
Dunn Products
Flash Shield Products
Frommelt Industries
Fyrepel Products, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Lynrus Finishing Co., Inc.
Midwest Glove Co., Inc.
Milburn Company
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Curtains, Welders'

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co., Safety Products Div.
Associated Bag & Apron Co.
Boyer-Campbell Co.
Dunn Products
Flash Shield Products
Frommelt Industries
Fyrepel Products, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.

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Midwest Glove Co., Inc.
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Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Flame Retardant Fabric

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
Chrysler Textiles Inc.,
Industratex Div.
Frommelt Industries
Genter, C. D., Co.
Herculite Protective Fabrics
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Lynrus Finishing Co., Inc.
Midwest Glove Co., Inc.
Minnesota Mining & Mfg. Co.
Pulsoman Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Singer Glove Mfg. Co.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Gloves and Mittens

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Charleston Rubber Co.
David's Gloves, Inc.
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Eastern Safety Equip. Co., Inc.
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Fisher Scientific Co.
Fyrepel Products, Inc.
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Genter, C. D., Co.
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Johns-Manville Sales Corp.
Jomac Inc.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Liberty Protective Leathers, Inc.
Linde Company,
Div. of Union Carbide Corp.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Pioneer Rubber Co.
Plasco Safety Products Co.
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Riegel Textile Corp.,
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Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Seiberling Latex Products
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.
Wilson Rubber Co.,
Div. of Becton, Dickinson & Co.
Wolverine Shoe & Tanning Corp.

Gloves, Heat Resistant

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
David's Gloves, Inc.
Dunn Products
Eastern Safety Equip. Co., Inc.
Edmont Inc.
Fisher Scientific Co.
Fyrepel Products, Inc.
Gebhardt, A. L., Co.
Genter, C. D., Co.
Goodall Rubber Co.
Halprin Supply Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Johns-Manville Sales Corp.
Jomac Inc.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Liberty Protective Leathers, Inc.
Linde Company,
Div. of Union Carbide Corp.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Riegel Textile Corp.,
Glove Div.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Gloves, Linemen's Protective

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Charleston Rubber Co.
David's Gloves, Inc.
Davis Emergency Equip. Co., Inc.
Dunn Products
Eastern Safety Equip. Co., Inc.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Surety Rubber Co.
Wheeler Protective Apparel, Inc.
Wilson Rubber Co.,
Div. of Becton, Dickinson & Co.
Wolverine Shoe & Tanning Corp.

Gloves, Metal Mesh

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
Boyer-Campbell Co.
David's Gloves, Inc.
Eastern Safety Equip. Co., Inc.
Gebhardt, A. L., Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.

Gloves, Reclaiming

Allied Glove Corp.
Boyer-Campbell Co.
Gebhardt, A. L., Co.
Genter, C. D., Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Standard Glove Co.

Gloves, Rubber or Synthetic

Advance Glove Mfg. Co.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Charleston Rubber Co.
David's Gloves, Inc.
Dunn Products
Eastern Safety Equip. Co., Inc.
Edmont Inc.
Fisher Scientific Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Granet Corp.
Halprin Supply Co.
Hood Rubber Products
Industrial Prod. Co.
International Latex Corp.
Jomac Inc.
Karel First Aid Supply Co.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pioneer Rubber Co.
Record Industrial Co.
Riegel Textile Corp.,
Glove Div.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.
Seiberling Latex Products
Singer Glove Mfg. Co.
Skyline Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Surety Rubber Co.
Wilson Rubber Co.,
Div. of Becton, Dickinson & Co.

Guards, Finger

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
David's Gloves, Inc.
Dunn Products
Eastern Safety Equip. Co., Inc.
Gebhardt, A. L., Co.
General Bandages, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Karel First Aid Supply Co.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Guards, Foot and Toe

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Dunn Products
Eastern Safety Equip. Co., Inc.
Ellwood Safety Appliance Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Guards, Shin

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Dunn Products
Ellwood Safety Appliance Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Hand Guards

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Associated Bag & Apron Co.
Boyer-Campbell Co.
Dunn Products
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Jomac Inc.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Plasco Safety Products Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Tool & Mfg. Co., Inc.
Wheeler Protective Apparel, Inc.

Handlines

Buhrke, R. H., Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Klein, Mathias, & Sons, Inc.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

See directory of Safety Equipment Sources for addresses.

classified safety products index

(section 6—continued)

Harness, Industrial Safety

American Allsafe Co., Inc.
Bashlin, W. M., Co.
Buhrke, R. H., Co.
Davis Emergency Equip. Co., Inc.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Gentex Corp.
Industrial Prod. Co.
Industrial Safety Belt Co.
Klein, Mathias, & Sons, Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.

Hooks, Safety Belt

American Allsafe Co., Inc.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.

Insoles

Bullard, E. D., Co.
Genter, C. D., Co.
Gentex Corp.
Goodall Rubber Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Jackets, Life, Industrial

Genter, C. D., Co.
Gentex Corp.
Industrial Prod. Co.
Institute of Industrial Launderers
Muter Company
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.

Lamps, Miners'

Davis Emergency Equip. Co., Inc.
General Electric Co.,
Large Lamp Department
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
National Mine Service Co.
Rochester Safety Equip. Co., Inc.

Lanyards

Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Genter, C. D., Co.
Industrial Prod. Co.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.

Leather Preserver, Water Repellent

Bashlin, W. M., Co.
Genter, C. D., Co.
Industrial Prod. Co.
Klein, Mathias, & Sons, Inc.
Miller Equip. Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Leathers, Hand

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
Boyer-Campbell Co.
David's Gloves, Inc.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Plasco Safety Products Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Leggings

Advance Glove Mfg. Co.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co.
Safety Products Div.
Associated Bag & Apron Co.
Boyer-Campbell Co.
Dunn Products
Ellwood Safety Appliances Co.
Gebhardt, A. L., Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Plasco Safety Products Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Linemen's Bags

Advance Glove Mfg. Co.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Charleston Rubber Co.
Dorsey, John E., Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Klein, Mathias, & Sons, Inc.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Re-Mar Products Corp.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.

Linemen's Rubber Protective Devices

Advance Glove Mfg. Co.
Boyer-Campbell Co.
Charleston Rubber Co.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Prod. Co.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.
Surety Rubber Co.

Measuring Device, Foot

Rochester Safety Equip. Co., Inc.

Overshoes, Neoprene, Non-Slip

American Allsafe Co., Inc.
Dunn Products
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Goodrich, B. F., Footwear & Flooring Co.
Hood Rubber Produtes
Industrial Prod. Co.
Iron Age Safety Shoe Div.,
H. Childs & Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Tingley Rubber Corp.

Overshoes, Rubber, Non-Slip

American Allsafe Co., Inc.
Beacon Falls Rubber Footwear
Dorsey, John E., Co.
Dunn Products
Genter, C. D., Co.
Goodall Rubber Co.
Goodrich, B. F., Footwear & Flooring Co.
Hood Rubber Products
Industrial Prod. Co.
Iron Age Safety Shoe Div.,
H. Childs & Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Surety Rubber Co.
Tingley Rubber Corp.

Pads, Knee

Advance Glove Mfg. Co.
Allied Glove Corp.
American Allsafe Co., Inc.
Boyer-Campbell Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Johnson Ladder Shoe Co., Inc.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
National Mine Service Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Plasco Safety Products Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
Wheeler Protective Apparel, Inc.

Pads, Miners

Advance Glove Mfg. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.

Protectors, Arm

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Associated Bag & Apron Co.
Boyer-Campbell Co.
Dunn Products
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Jomac Inc.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Plasco Safety Products Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Protectors, Finger

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Dunn Products
Eastern Safety Equip. Co., Inc.
General Bandages, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Johns-Manville Sales Corp.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Standard Glove Co.
Wheeler Protective Apparel, Inc.
Wilson Rubber Co.,
Div. of Becton, Dickinson & Co.

Protectors, Knee

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Dunn Products
Ellwood Safety Appliance Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Protectors, Linemen's

Advance Glove Mfg. Co.
Allied Glove Corp.
Bashlin, W. H., Co.
Boyer-Campbell Co.
Charleston Rubber Co.
Davis Emergency Equip. Co., Inc.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Klein, Mathias, & Sons, Inc.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.

To locate Advertisements, see Advertisers' Index.

Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Sager Glove Corp.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Surety Rubber Co.

Radar Meter

Genter, C. D., Co.

Rescue Suits

Advance Glove Mfg. Co.
Clark, David, Co., Inc.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
Mine Safety Appliances Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Wheeler Protective Apparel, Inc.

Rope Grab, Life Line

American Allsafe Co., Inc.
Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Jay, D., Products Co., Inc.
Miller Equip. Co., Inc.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.

Sandals, Non-Skid

Genter, C. D., Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Safety Clothing & Equip. Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Safety Equip. Co.
Tingley Rubber Corp.

Sandals, Shower

Beacon Falls Rubber Footwear
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.

Sandals, Wooden Sole

Boyer-Campbell Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.

Self-Rescuers, Miners'

Draeger Oz. App. Corp.
Mine Safety Appliance Co.

Shield, Welding

American Allsafe Co., Inc.
American Optical Co.
Safety Products Div.
Boyer-Campbell Co.
Cordo Chemical Corp.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
Frommelt Industries
Genter, C. D., Co.
Industrial Prod. Co.
Kimball Safety Prod. Co.
Mine Safety Appliances Co.
National Mine Service Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Seilstrom Mfg. Co.
Standard Glove Co.

Shirts, Anatomical

Mine Safety Appliances Co.

Shoe Preserver, Water Repellent

Boyer-Campbell Co.
Genter, C. D., Co.
Hy-Test Safety Shoes,
Div. International Shoe Co.
Industrial Prod. Co.
Miller Equip. Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Standard Glove Co.

Shoes, Conductive

Genter, C. D., Co.
Hy-Test Safety Shoes,
Div. International Shoe Co.
Legge, Walter G., Co., Inc.
Lehigh Safety Shoe Co.
McAn, Thom, Safety Shoe Div.
Record Industrial Co.

Shoes, Leather, Linemen's

Bashlin, W. M., Co.
Genter, C. D., Co.
Hy-Test Safety Shoes,
Div. International Shoe Co.
Knapp Bros. Shoe Mfg. Co.
Lehigh Safety Shoe Co.
Miller Equip. Co., Inc.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Wolverine Shoe & Tanning Corp.

Shoes, Non-Sparking

Genter, C. D., Co.
Hy-Test Safety Shoes,
Div. International Shoe Co.
Iron Age Safety Shoe Div.,
H. Childs & Co., Inc.
Lehigh Safety Shoe Co.
McAn, Thom, Safety Shoe Div.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.

Shoes, Orthopedic

Gebhardt, A. L., Co.
Karel First Aid Supply Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.

Shoes, Orthopedic, Wooden Sole

Gebhardt, A. L., Co.
Genter, C. D., Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
New Jersey Safety Equip. Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.

Shoes, Rubber, Safety Toe

American Allsafe Co., Inc.
Beacon Falls Rubber Footwear
Boyer-Campbell Co.
Dunn Products
Genter, C. D., Co.
Goodrich, B. F., Footwear & Flooring
Hood Rubber Products
Industrial Prod. Co.
Iron Age Safety Shoe Div.,
H. Childs & Co., Inc.
Lehigh Safety Shoe Co.
Midwest Glove Co., Inc.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Tingley Rubber Corp.
Wamsutta-Pacific Industrial Div.,
M. Lowenstein & Sons, Inc.

Shoes, Safety Toe

American Allsafe Co., Inc.
Barnett, Art, Uniform Co.
Boyer-Campbell Co.
Bronson Shoe Co.
Genter, C. D., Co.
Goodrich, B. F., Footwear & Flooring Co.
Haus of Krause
Hood Rubber Products
Hy-Test Safety Shoes,
Div. International Shoe Co.
Iron Age Safety Shoe Div.,
H. Childs & Co., Inc.
Knapp Bros. Shoe Mfg. Corp.
Lehigh Safety Shoe Co.
McAn, Thom, Safety Shoe Div.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety First Shoe Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Wolverine Shoe & Tanning Corp.

Shoes, Women's

Barnett, Art, Uniform Co.
Genter, C. D., Co.
Hy-Test Safety Shoes,
Div. International Shoe Co.
Iron Age Safety Shoe Div.,
H. Childs & Co., Inc.
Lehigh Safety Shoe Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
United States Rubber Co.

Shoes, Wooden Sole

Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Midwest Glove Co., Inc.
New Jersey Safety Equip. Co.
Record Industrial Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.

Sleeves, Linemen's Rubber

Aljay Mfg. Co., Inc.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Charleston Rubber Co.
Eastern Safety Equip. Co., Inc.
Genter, C. D., Co.
Goodall Rubber Co.
Industrial Prod. Co.
Midwest Glove Co., Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Salisbury, W. H., & Co.
Snyder, M. L., & Sons, Inc.
Standard Glove Co.
Surety Rubber Co.

Sleeves, Protective

Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Optical Co.,
Safety Products Div.
Associated Bag & Apron Co.
Boyer-Campbell Co.
Charleston Rubber Co.
Chicago Eye Shield Co.
Dunn Products
Eastern Safety Equip. Co., Inc.
Frommelt Industries
Fyrepel Products, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Goodall Rubber Co.
Halperin, A. E., Co., Inc.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Johns-Manville Sales Corp.
Jomac Inc.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Milburn Company
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Singer Glove Mfg. Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.
Standard Safety Equip. Co.
West Chemical Prod., Inc.
Wheeler Protective Apparel, Inc.

Socks, Safety

The Alden Mills
Genter, C. D., Co.
Miller Equip. Co., Inc.
Pendergast, Albert W., Safety Equip. Co.
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Sager Glove Corp.

Soles, Shoe, Non-Slip

American Bilrite Rubber Co.
Bearfoot Sole Co.
Cambridge Rubber Co.
Emerson, J. H., Co.
Genter, C. D., Co.
Goodyear Tire & Rubber Co.
Gro-Cord Rubber Co.
Industrial Prod. Co.
Quabaug Rubber Co.
Record Industrial Co.
Ripple Sole Corp.
Rochester Safety Equip. Co., Inc.
Snyder, M. L., & Son, Inc.

Static Ground Device, Personnel

Legge, Walter G., Co., Inc.

Steel Toes, Safety Shoes

Barnett, Art, Uniform Co.
Genter, C. D., Co.
Hy-Test Safety Shoes,
Div. International Shoe Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety Box Toe Co.
Scientific Industrial Supply Co.

Straps, Safety

Advance Glove Mfg. Co.
American Allsafe Co., Inc.
Atlas Safety Equip. Co., Inc.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Gebhardt, A. L., Co.
Genter, C. D., Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Klein, Mathias, & Son, Inc.
Miller Equip. Co., Inc.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Standard Glove Co.

See directory of Safety Equipment Sources for addresses.

Tarpaulins, Plastic
Advance Glove Mfg. Co.
Aljay Mfg. Co., Inc.
Associated Bag & Apron Co.
Cordo Chemical Corp.
Frommelt Industries
Genter, C. D., Co.
Herculite Protective Fabrics
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Marryatt-Lane & Co., Inc.
Pendergast, Albert W., Safety Equip. Co.
Plastimayd Corp.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.

Toe Guards
American Allsafe Co., Inc.
Boyer-Campbell Co.
Ellwood Safety Appliance Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Reece Wooden Sole Shoe Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Standard Glove Co.
Standard Safety Equip. Co.

Uniforms, Industrial
Barnett, Art, Uniform Co.
Fashion Seal Uniforms
Genter, C. D., Co.
Industrial Prod. Co.
Institute of Industrial Launderers
Milburn Company
Record Industrial Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Scientific Industrial Supply Co.
Setlow, M., & Son, Inc.
Standard Glove Co.
Workion, Inc.

Vests, Protective
Aljay Mfg. Co., Inc.
Genter, C. D., Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Wheeler Protective Apparel, Inc.

Wall Grips
General Scientific Equip. Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.

Welders' Protective Equipment
Advance Glove Mfg. Co.
Air Reduction Sales Co.
Aljay Mfg. Co., Inc.
Allied Glove Corp.
American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American Optical Co., Safety Products Div.
Bausch & Lomb Optical Co.
Boyer-Campbell Co.
Eastern Safety Equip. Co., Inc.
Fibre-Metal Prod. Co.
Frommelt Industries
Fyrepel Products, Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Holcomb Safety Garment Co.
Industrial Gloves Co.
Industrial Prod. Co.
Kennedy-Ingalls, Inc.
Kimball Safety Prod. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Sager Glove Corp.
Scientific Industrial Supply Co.
Sellstrom Mfg. Co.
Singer Glove Mfg. Co.
Standard Glove Co.
Wheeler Protective Apparel, Inc.

Section 7
Materials Handling

Alarms, Truck and Equipment, Back-Up
American Allsafe Co., Inc.
Atkinson Dynamics
Bullard, E. D., Co.
Fyr-Fyter Co.
Industrial Prod. Co.
Notifier Corp.
Protectoseal Company
Safety First Supply Co.

Barrel Lifters
American Allsafe Co., Inc.
Baker Industrial Trucks, Div. of Otis Elevator Co.
Boyer-Campbell Co.
Downs Crane & Hoist Co.
Elwell-Parker Electric Co.
Industrial Prod. Co.
Lewis-Shephard Prod., Inc.
Merrill Brothers
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pennsylvania Sling Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Standard Safety Equip. Co.
Sterling-Fleischman Co.
Uhrden, Inc.

Barrel and Drum Movers
American Allsafe Co., Inc.
Boyer-Campbell Co.
Downs Crane & Hoist Co.
General Scientific Equip. Co.
Industrial Prod. Co.
Lewis-Shephard Prod., Inc.
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Sterling-Fleischman Co.
Uhrden, Inc.

Barrel Stands
American Allsafe Co., Inc.
Boyer-Campbell Co.
General Scientific Equip. Co.
Lewis-Shephard Prod., Inc.
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Sterling-Fleischman Co.

Blockers, Mine Car
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Blockers, Railroad Car
General Scientific Equip. Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Bottle Carriers
Bil-Jax, Inc.
Fyrepel Products, Inc.
General Scientific Equip. Co.
Industrial Prod. Co.
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Protectoseal Company
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Bottle Crushers
Laduby Co., Inc.
Vis-O-Lite Co., Inc.

Buckets, Elevator
Baker Industrial Trucks, Div. of Otis Elevator Co.
Link-Belt Co.
Miller Equip. Co., Inc.

Buckets, Hoisting
Link-Belt Co.
Miller Equip. Co., Inc.
Safety First Supply Co.

Buckets, Rubber
Boyer-Campbell Co.
Dunn Products
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Standard Glove Co.

Buckets, Rubber, Fiber
Fortex Industries, Inc.

Cable Wire
Aluminum Co. of America
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
Genter, C. D., Co.
Macwhyte Wire Rope Company
United States Steel Corp.

Carboy Drainer
American Allsafe Co., Inc.
Boyer-Campbell Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Thompson Mfg. Co., Inc.

Carboy, Plastic
Boyer-Campbell Co.
General Scientific Equip. Co.
Industrial Prod. Co.
Jones & Laughlin Steel Corp.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Carboy, Tilter
American Allsafe Co., Inc.
Boyer-Campbell Co.
General Scientific Equip. Co.
Industrial Prod. Co.
Lewis-Shephard Prod., Inc.
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Standard Safety Equip. Co.
Thompson Mfg. Co., Inc.

Carboy Truck
American Allsafe Co., Inc.
Boyer-Campbell Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Lewis-Shephard Prod., Inc.
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Thompson Mfg. Co., Inc.

Car Door Opener
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.

Car, Hopper Closer
Boyer-Campbell Co
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Safety First Supply Co.

Car, Spotters
Industrial Prod. Co.
Link-Belt Co.

Carriers, Cylinders
American Allsafe Co., Inc.
Baker Industrial Trucks, Div. of Otis Elevator Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Karel First Aid Supply Co.
New Jersey Safety Equip. Co.
Safety First Supply Co.

Carriers, Drum and Barrel
American Allsafe Co., Inc.
Baker Industrial Trucks, Div. of Otis Elevator Co.
Boyer-Campbell Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Lewis-Shephard Prod., Inc.
Link-Belt Co.
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.

Carriers, Magnetic
Multifinish Mfg. Co.
Rochester Safety Equip. Co., Inc.

Chain
American Chain Div., American Chain & Cable Co., Inc.
Campbell Chain Co.
Columbus McKinnon Chain Corp.
Link-Belt Co.
McKay Co.
Pennsylvania Sling Co.
Safety First Supply Co.
Taylor, S. G., Chain Co., Inc.

Chains, Coil
American Chain Div., American Chain & Cable Co., Inc.
Campbell Chain Co.
Columbus McKinnon Chain Corp.
McKay Co.
Taylor, S. G., Chain Co., Inc.

Chains, Magnetic
Campbell Chain Co.
McKay Co.
Taylor, S. G., Chain Co., Inc.

Chain, Spark Resisting
Campbell Chain Co.
McKay Co.
Scientific Industrial Supply Co.
Taylor, S. G., Chain Co., Inc.

To locate Advertisements, see Advertisers' Index.

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(section 7—continued)

Chains, Sling
Boyer-Campbell Co.
Campbell Chain Co.
Columbus McKinnon Chain Corp.
Industrial Prod. Co.
McKay Co.
Merrill Brothers
Pennsylvania Sling Co.
Rochester Safety Equip. Co., Inc.
Taylor, S. G., Chain Co., Inc.

Chairs, Safety Boatswain
American Allsafe Co., Inc.
Cramer Posture Chair Co., Inc.
Marryatt-Lane & Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.

Chocks, Wheel
Aldon Co.
Calumet Steel Castings Corp.
Industrial Prod. Co.
Magline, Inc.
Magnesium Co. of America
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.

Clamps, Cable
Carroll Pressed Metal, Inc.
Genter, C. D., Co.
Industrial Prod. Co.
Newco Mfg. Co., Inc.
Pennsylvania Sling Co.

Clamps, Plate Lifting
Downs Crane & Hoist Co.
Merrill Brothers
Pennsylvania Sling Co.
Renfroe, J. C. & Sons, Inc.
Rochester Safety Equip. Co., Inc.

Clamps, Rail
Genter, C. D., Co.
Industrial Prod. Co.
Pendergast, Albert W., Safety Equip. Co.
Safety First Supply Co.
Standard Glove Co.

Clamps, Wire Rope
American Chain & Cable Co., Inc., (Wilkes-Barre, Pa.)
Bethlehem Steel Co.
Boyer-Campbell Co.
Broderick & Bascom Rope Co.
Canton Mfg. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Newco Mfg. Co., Inc.
Pennsylvania Sling Co.
Rochester Safety Equip. Co., Inc.

Coating, Packages, Anti-Slip
Genter, C. D., Co.

Connectors, Cable
Air Reduction Sales Co.
Fibre-Metal Prod. Co.
Genter, C. D., Co.
Joy Mfg. Co., Electrical Prod. Div.
Nupla Mfg. Co., Div. of New Plastic Corp.
Pyle-National Co.

Connectors, Electrical
Ericson Mfg. Co.
Genter, C. D., Co.
Joy Mfg. Co., Electrical Prod. Div.
National Mine Service Co.
Nupla Mfg. Co., Div. of New Plastic Corp.
Pyle-National Co.

Connectors, Wire Rope
Bethlehem Steel Co.
Genter, C. D., Co.
Industrial Prod. Co.
Miller Equip. Co., Inc.

Crane, Safety Warning Device
Dillon, W. C., & Co., Inc.
Electro-Alarm Safety Devices
Industrial Prod. Co.
Safety First Supply Co.
Standard Glove Co.

Dockboards
Bustin Steel Products, Inc.
Industrial Prod. Co.
Magline, Inc.
Magnesium Co. of America
Pendergast, Albert W., Safety Equip. Co.
Safety First Supply Co.

Dock Shelter
Frommelt Industries

Drum Fittings
Bustin Steel Products, Inc.
New Jersey Safety Equip. Co.
Protectoseal Company

Drum Openers
Industrial Prod. Co.
Merrill Brothers
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.

Dynamometer
Dillon, W. C., & Co., Inc.

Elevator, Personnel Demountable
Hawkeye Prod. Corp.

Hoists, Chain
Boyer-Campbell Co.
Chisholm-Moore Hoist Div.
Jones & Laughlin Steel Corp.
Pennsylvania Sling Co.
Robbins & Myers, Inc.

Hoists, Electric
American Chain & Cable Co., Inc. Wright Hoist Div.
Boyer-Campbell Co.
Chisholm-Moore Hoist Div.
Jones & Laughlin Steel Corp.
Pennsylvania Sling Co.
Robbins & Myers, Inc.
Shepard Niles Crane & Hoist Corp.

Hoists, Manual
American Chain & Cable Co., Inc. Wright Hoist Div.
Boyer-Campbell Co.
Chisholm-Moore Hoist Div.
Morrison-Pelsue Co.
Pennsylvania Sling Co.
Robbins & Myers, Inc.
Shepard Niles Crane & Hoist Corp.

Hooks, Hoisting
Boyer-Campbell Co.
Columbus McKinnon Chain Corp.
Lowery Brothers, Inc.
McKay Co.
Miller Swivel Prod., Inc.
Morse Mfg. Co., Inc.
National Swage Tool & Die Corp.
Newco Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Pennsylvania Sling Co.
Safety First Supply Co.
Taylor, S. G., Chain Co., Inc.

Hooks, Safety
American Allsafe Co., Inc.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Bullard, E. D., Co.
Columbus McKinnon Chain Corp.
General Scientific Equip. Co.
Genter, C. D., Co.
Harrington Company
Industrial Prod. Co.
Klein, Mathias, & Sons, Inc.
Lowery Brothers, Inc.
McKay Co.
Miller Swivel Prod., Inc.
National Swage Tool & Die Corp.
Newco Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Pennsylvania Sling Co.
Safety First Supply Co.
Shepard Niles Crane & Hoist Corp.
Standard Glove Co.

Hose Bridge
Halprin Supply Co.

Inclinators, Carboy
American Allsafe Co., Inc.
General Scientific Equip. Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.

Insulated Safety Links
American Allsafe Co., Inc.
Bullard, E. D., Co.
Industrial Prod. Co.
Miller Swivel Prod., Inc.
Pennsylvania Sling Co.

Lifting Equipment, Industrial
Baker Industrial Trucks, Div. of Otis Elevator Co.
Downs Crane & Hoist Co.
Elwell-Parker Electric Co.
Lewis-Shephard Prod., Inc.
Lowery Brothers, Inc.
Marryatt-Lane & Co., Inc.
Merrill Brothers
National Swage Tool & Die Corp.
New Jersey Safety Equip. Co.
Pennsylvania Sling Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Uhrden, Inc.

Line Construction Equipment and Tools
Industrial Prod. Co.
Klein, Mathias, & Sons, Inc.
Miller Equip. Co., Inc.
Petersen Engineering Co., Inc.
Safety First Supply Co.

Load Binders
Canton Mfg. Co.
Newco Mfg. Co., Inc.
Pennsylvania Sling Co.

Materials Handling Devices
Baker Industrial Trucks Div. of Otis Elevator Co.
Downs Crane & Hoist Co.
Elwell-Parker Electric Co.
Hamilton Tool Co.
Hollaender Mfg. Co.
Industrial Prod. Co.
Lewis-Shephard Prod., Inc.
Link-Belt Co.
Lowery Brothers, Inc.
Magline, Inc.
Magnesium Co. of America
Merrill Brothers
National Swage Tool & Die Corp.
Nichols Engineering Co.
Pennsylvania Sling Co.
Rol-Away Truck Mfg. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Spaulding Fibre Co., Inc.
Uhrden, Inc.

Movers, Railway Car
Aldon Co.
American Allsafe Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Link-Belt Co.
Safety First Supply Co.

Platforms, Tank Car or Tank Truck
Nichols Engineering Co.

Racks, Barrel
General Scientific Equip. Co.
Hollaender Mfg. Co.
Industrial Prod. Co.
Lewis-Shephard Prod., Inc.
Morse Mfg. Co., Inc.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.

Rail Punch
Mine Safety Appliances Co.

Ramps and Runways
Bil-Jax, Inc.
Magline, Inc.
Safety First Supply Co.

Reducers, Speed
Boyer-Campbell Co.
Link-Belt Co.

Reels, Cable
Erickson Mfg. Co.
Lowery Brothers, Inc.
National Swage Tool & Die Corp.
United Specialties, Inc.

Reels, Static Discharge
Erickson Mfg. Co.

Reels, Welding Hose
United Specialties, Inc.

Reels, Wire
Bashlin, W. M., Co.

Rope, Barrier (Plastic)
American Allsafe Co., Inc.
Industrial Prod. Co.
Jay, D., Products Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Safety First Supply Co.

Rope, Wire
American Chain & Cable Co., Inc. (Wilkes-Barre, Pa.)
Bethlehem Steel Co.
Colorado Fuel & Iron Corp.
Industrial Prod. Co.
Jones & Laughlin Steel Corp.
Lowery Brothers, Inc.
Macwhyte Wire Rope Company
National Mine Service Co.
National Swage Tool & Die Corp.
Pennsylvania Sling Co.
Union Wire Rope Corp., Sub. of Armco Steel Corp.
United States Steel Corp.
Wire Rope Corp. of America, Inc.

Rope, Wire, Plastic Conted
Genter, C. D., Co.
Jones & Laughlin Steel Corp.
Lowery Brothers, Inc.
Macwhyte Wire Rope Company
National Swage Tool & Die Corp.
Pennsylvania Sling Co.
Union Wire Rope Corp., Sub. of Armco Steel Corp.

Rope, Wire, Stainless Steel
American Chain & Cable Co., Inc. (Wilkes-Barre, Pa.)
Broderick & Bascom Rope Co.
Genter, C. D., Co.
Jones & Laughlin Steel Corp.
Lowery Brothers, Inc.
Macwhyte Wire Rope Company
National Swage Tool & Die Corp.
Pennsylvania Sling Co.
United States Steel Corp.
Wire Rope Corp. of America, Inc.

See directory of Safety Equipment Sources for addresses.

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Shock-Proof Steering Wheels for Lift Trucks
Kosch Mfg. Co.

Slings, Chain
American Chain & Cable Co., Inc.
American Chain Div.
Boyer-Campbell Co.
Campbell Chain Co.
Columbus McKinnon Chain Corp.
Downs Crane & Hoist Co.
Industrial Prod. Co.
Jones & Laughlin Steel Corp.
Lowery Brothers, Inc.
McKay Co.
Merrill Brothers
National Swage Tool & Die Corp.
Pennsylvania Sling Co.
Taylor, S. G., Chain Co., Inc.

Sling, Nylon Web
American Allsafe Co., Inc.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Bullard, E. D., Co.
Downs Crane & Hoist Co.
Frommelt Industries
Genter, C. D., Co.
Goodall Rubber Co.
Jones & Laughlin Steel Corp.
Lowery Brothers, Inc.
Marryatt-Lane & Co., Inc.
Miller Equip. Co., Inc.
National Swage Tool & Die Corp.
Pendergast, Albert W., Safety Equip. Co.
Pennsylvania Sling Co.
Rose Mfg. Co.

Sling, Protectors
Frommelt Industries
Lowery Brothers, Inc.
National Swage Tool & Die Corp.
Newco Mfg. Co., Inc.
Pennsylvania Sling Co.
Union Wire Rope Corp.,
Sub. of Armco Steel Corp.

Sling, Wire Rope
American Allsafe Co., Inc.
American Chain & Cable Co., Inc.
(Wilkes-Barre, Pa.)
Bethlehem Steel Co.
Boyer-Campbell Co.
Broderick & Bascom Rope Co.
Colorado Fuel & Iron Corp.
Downs Crane & Hoist Co.
Genter, C. D., Co.
Industrial Prod. Co.
Jones & Laughlin Steel Corp.
Lowery Brothers, Inc.
Macwhyte Wire Rope Company
National Mine Service Co.
National Swage Tool & Die Corp.
Pennsylvania Sling Co.
Union Wire Rope Corp.,
Sub. of Armco Steel Corp.
Wire Rope Corp. of America, Inc.

Sling, Woven Wire
Cambridge Wire Cloth Co.
Downs Crane & Hoist Co.
Jones & Laughlin Steel Corp.
Lowery Brothers, Inc.
Macwhyte Wire Rope Company
National Swage Tool & Die Corp.
Pennsylvania Sling Co.
Union Wire Rope Corp.,
Sub. of Armco Steel Corp.

Tension Stringing Equipment, Wire
Petersen Engineering Co., Inc.

Tire Chain and Accessories
American Chain & Cable Co., Inc.
American Chain Div.
Campbell Chain Co.
Taylor, S. G., Chain Co., Inc.

Trucks, Aerial
Truck Equip. Co.

Trucks, Fork Lift
Lewis-Shepherd Prod., Inc.
Scientific Industrial Supply Co.
Uhrden, Inc.

Trucks, Portable Hand
Aluminum Ladder Co.
Hamilton Tool Co.
Industrial Prod. Co.
Lewis-Shepherd Prod., Inc.
Magline, Inc.
Magnesium Co. of America
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Rol-Away Truck Mfg. Co., Inc.
Scientific Industrial Supply Co.
Spaulding Fibre Co., Inc.
Uhrden, Inc.

Trucks, Safety Steps
Bullard, E. D., Co.
Cotterman, I. D.
Industrial Prod. Co.
Rol-Away Truck Mfg. Co., Inc.
Safety First Supply Co.

Wheel Blocks, Truck
Aldon Co.
Calumet Steel Casting Corp.
Industrial Prod. Co.
Magline, Inc.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.

Wire Rope Fittings
American Chain & Cable Co., Inc.
(Wilkes-Barre, Pa.)
Bashlin, W. M., Co.
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
Genter, C. D., Co.
Jones & Laughlin Steel Corp.
Lowery Brothers, Inc.
Macwhyte Wire Rope Company
Miller Swivel Prod., Inc.
National Mine Service Co.
National Swage Tool & Die Corp.
Newco Mfg. Co., Inc.
Pennsylvania Sling Co.
Union Wire Rope Corp.,
Sub. of Armco Steel Corp.

Section 8
Machine Operation and Guarding

Air Compressors
DeVilbiss Co.
Gardner-Denver Co.
Safety First Supply Co.

Air Ejectors
Boyer-Campbell Co.
Littell, F. J., Machine Co.
Vac-U-Mation Div.
Schrader's, A., Son

Bags, Linemen's Tools
Boyer-Campbell Co.
Buhrke, R. H., Co.
Genter, C. D., Co.
Industrial Gloves Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
Re-Mar Products Corp.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Salisbury, W. H., & Co.
Scientific Industrial Supply Co.

Beryllium Non-Sparking Tools
Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.

Carton Openers
Flash Mfg. Co.
Rochester Safety Equip. Co., Inc.

Chisel Grips
American Allsafe Co., Inc.
Boyer-Campbell Co.
General Scientific Equip. Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Rose Mfg. Co.
Safety First Supply Co.
Tool & Mfg. Co. Inc.

Clamps
Aluminum Co. of America
Custanite Corp.
Genter, C. D., Co.
Renfroe, J. C., & Sons, Inc.

Clamps, Sockets and Eyebolts
Crosby-Laughlin Div.,
American Hoist & Derrick Co.
Genter, C. D., Co.

Cords, Electric
Ericson Mfg. Co.
National Mine Service Co.
Pendergast, Albert W., Safety Equip. Co.
Safety First Supply Co.
Whitney Blake Company

Cords, Extension
Ericson Mfg. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Whitney Blake Company

Covers, Machine, Plastic
Associated Bag & Apron Co.
Frommelt Industries
Industrial Gloves Co.
Pendergast, Albert W., Safety Equip. Co.

Cutters, Cable
Genter, C. D., Co.
Industrial Prod. Co.

Cutters, Wire Rope
Genter, C. D., Co.
Industrial Prod. Co.

Drill Table, Safety
Modern Machine Tool Co.

Electrode Holders
Air Reduction Sales Co.
Aljay Mfg. Co., Inc.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Fibre-Metal Prod. Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Rochester Safety Equip. Co., Inc.
Standard Glove Co.

Elevating Table
Hamilton Tool Co.

Explosion-Proof Switches
Micro-Switch Div.
Pyle-National Co.

Feeders, Punch Press
Boyer-Campbell Co.
Industrial Prod. Co.
Littell, F. J., Machine Co.
Vac-U-Mation Div.
Multifinish Mfg. Co.
New Jersey Safety Equip. Co.
Osborn Mfg. Corp.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.

Gage Glasses
Black, Sivalls & Bryson, Inc.
Corning Glass Works
Dockson Corp.
Genter, C. D., Co.
Sellstrom Mfg. Co.

Grinders, Tool
Skil Corp.

Guard Materials
Acro Metal Stamping Co.
Bil-Jax, Inc.
Globe Co.,
Products Div.,
Magline, Inc.
Safety First Supply Co.

Guard, All-Steel, Corner
Bil-Jax, Inc.
Globe Co.,
Products Div.

Guards for Edged Tools
Buhrke, R. H., Co.
Safety First Supply Co.

Guards, Fan
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Scientific Industrial Supply Co.

Guards, Gear
Acro Metal Stamping Co.
Searjeant Metal Prod., Inc.

Guards, Grinders, Portable
Acro Metal Stamping Co.
Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Morrison Prod., Inc.
New Jersey Safety Equip. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.

Guards, Grinding Wheel
Acro Metal Stamping Co.
Boyer-Campbell Co.
Carroll Pressed Metal, Inc.
Genter, C. D., Co.
Industrial Prod. Co.
Junkin Safety Appliance Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Standard Safety Equip. Co.

Guards, Guide Pin
Boyer-Campbell Co.
Central Safety Equip. Co.
Genter, C. D., Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Wiesman Mfg. Co.

To locate Advertisements, see Advertisers' Index.

classified safety products index

(section 8—continued)

Guards, Jointer
American Allsafe Co., Inc.
Boyer-Campbell Co.
Brett-Guard Corp.
Genter, C. D., Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Peterson, R. E., Co.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.

Guards, Kick Press
Acro Metal Stamping Co.
Boyer-Campbell Co.
Genter, C. D., Co.
New Jersey Safety Equip. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Searjeant Metal Prod., Inc.

Guards, Lathe
Acro Metal Stamping Co.
Genter, C. D., Co.
Industrial Prod. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.

Guards, Lamps
Ericson Mfg. Co.
Genter, C. D., Co.
Gets-A-Lite Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.

Guards, Machine
Acro Metal Stamping Co.
General Automation Corp.
Genter, C. D., Co.
Globe Co.,
Products Div.
Hollaender Mfg. Co.
Industrial Prod. Co.
Micro-Switch Div.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Searjeant Metal Prod., Inc.

Guards, Planer
Acro Metal Stamping Co.
DeWalt Div.,
American Machine & Foundry Co.
Genter, C. D., Co.
Industrial Prod. Co.

Guards, Platen Press
Genter, C. D., Co.
General Automation Corp.
Magline, Inc.

Guards, Portable Lamp
Ericson Mfg. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Pendergast, Albert W., Safety Equip. Co.

Guards, Power Press
Acro Metal Stamping Co.
American Allsafe Co., Inc.
Boyer-Campbell Co.
Genter, C. D., Co.
General Automation Corp.
Junkin Safety Appliance Co., Inc.
Magline, Inc.
Micro-Switch Div.
New Jersey Safety Equip. Co.
Positive Safety Mfg. Co.
Rochester Safety Equip. Co., Inc.
Safeguard Mfg. Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Schrader's, A., Son
Searjeant Metal Prod., Inc.
Standard Safety Equip. Co.
Wiesman Mfg. Co.

Guards, Power Shear
Acro Metal Stamping Co.
Genter, C. D., Co.
New Jersey Safety Equip. Co.
Safety Clothing & Equip. Co.
Schrader's, A., Son
Searjeant Metal Prod., Inc.

Guards, Saw
Acro Metal Stamping Co.
American Allsafe Co., Inc.
Bashlin, W. M., Co.
Boyer-Campbell Co.
Brett-Guard Corp.
Buhrke, R. H., Co.
DeWalt Div.,
American Machine & Foundry Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Peterson, R. E., Co.
Protectoseal Company
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Standard Safety Equip. Co.

Guards, Shaper
Acro Metal Stamping Co.
Boyer-Campbell Co.
DeWalt Div.,
American Machine & Foundry Co.
Genter, C. D., Co.
Industrial Prod. Co.
Peterson, R. E., Co.
Safety Clothing & Equip. Co.
Safety First Supply Co.

Guards, Steel Strapping
Acro Metal Stamping Co.
Genter, C. D., Co.

Guards, Wire
Genter, C. D., Co.
Globe Co.,
Products Div.

Holders, Soldering Irons, Adjustable
Wilder Mfg. Co., Inc.

Insulation, Tester
Sticht, Herman H., Co., Inc.

Keys, Safety Chuck
Boyer-Campbell Co.
Lummis Mfg. Co.

Knives, Safety
Flash Mfg. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Miller Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.

Lamp, Adjustable
Industrial Prod. Co.
Stonco Electric Products Co.
Swivelier Company, Inc.

Lamp Extension
Ericson Mfg. Co.
Industrial Prod. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Stonco Electric Products Co.

Lamps, Portable Electric
American LaFrance,
Div. of Sterling Precision Corp.
Bright Star Industries
Carpenter Mfg. Co.
Dietz, R. E., Co.
Ericson Mfg. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Joy Mfg. Co.,
Electrical Prod. Div.
Lewis Instruments Inc.
Luxo Lamp Corp.
National Mine Service Co.
Pyle-National Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Stonco Electric Products Co.
Swivelier Company, Inc.
Tedcar Products Co.
U-C-Lite Mfg. Co.
Wilson Prod. Div.,
Ray-O-Vac Co.

Lanterns, Carbide
Genter, C. D., Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.

Lanterns, Electric
American LaFrance,
Div. of Sterling Precision Corp.
Bright Star Industries
Carpenter Mfg. Co.
Dietz, R. E., Co.
Genter, C. D., Co.
Industrial Prod. Co.
Lewis Instruments Inc.
Mine Safety Appliances Co.
National Mine Service Co.
Portable Light Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Tedcar Products Co.
U-C-Lite Mfg. Co.

Lifters, Vacuum
American Allsafe Co., Inc.
Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Littell, F. J., Machine Co.
Vac-U-Mation Div.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Standard Glove Co.

Lock-Outs, Electric Switch
American Allsafe Co., Inc.
Industrial Prod. Co.
Osborn Mfg. Corp.
Pendergast, Albert W., Safety Equip. Co.
Scientific Industrial Supply Co.

Mauls, Rubber
Genter, C. D., Co.
Goodall Rubber Co.
Johnson Ladder Shoe Co., Inc.
Nupla Mfg. Co.,
Div. of New Plastic Corp.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Mauls, Wood
Nupla Mfg. Co.,
Div. of New Plastic Corp.
Safety First Supply Co.

Non-Sparking Tools
American Allsafe Co., Inc.
Beryllium Corp.
Boyer-Campbell Co.
Custanite Corp.
General Scientific Equip. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Morse Mfg. Co., Inc.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.

Ohmeters, Safety
Conductive Hospital Accessories Corp.
Sticht, Herman H., Co., Inc.

Padlocks
Boyer-Campbell Co.
Industrial Prod. Co.
Master Lock Co.

Plastics for Shields and Guards
Genter, C. D., Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Standard Glove Co.

Power Machine, Electric Control
General Automation Corp.

Power Press, Safety Control Kits
American Allsafe Co., Inc.
General Automation Corp.

Pullers, Cable
Harrington Company
Petersen Engineering Co., Inc.
Truck Equip. Co.

Pullers, Fuse
Industrial Prod. Co.
Safety First Supply Co.

Reflectors, Lamp
Genter, C. D., Co.
Industrial Prod. Co.

Refueling Controls
OPW-Jordan Corp.

Regulators, Gas
Black, Sivalls & Bryson, Inc.
Dockson Corp.
Draeger Ox. App. Corp.
Genter, C. D., Co.
Linde Company,
Div. of Union Carbide Corp.
Safety First Supply Co.

Sheet Lifters, Magnetic
Genter, C. D., Co.
Multifinish Mfg. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Safety First Supply Co.

Sheet Lifters, Vacuum
Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Littell, F. J., Machine Co.
Vac-U-Mation Div.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Standard Glove Co.

Tool Holsters (Tool Holder)
Bashlin, W. M., Co.
Boyer-Campbell Co.
Buhrke, R. H., Co.
Genter, C. D., Co.
Industrial Prod. Co.
Rose Mfg. Co.
Safety First Supply Co.
Standard Glove Co.

Tool, Linemen's
Genter, C. D., Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.

Tools, Marking
Cunningham, M. E., Co.
Industrial Prod. Co.
Proto Tool Co.
Safety First Supply Co.

Tools, Non-ferrous Metal
Ampco Metal, Inc.
Beryllium Corp.
Boyer-Campbell Co.
Custanite Corp.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Nupla Mfg. Co.,
Div. of New Plastic Corp.
Pendergast, Albert W., Safety Equip. Co.
Scientific Industrial Supply Co.

See directory of Safety Equipment Sources for addresses.

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Tools, Safety

Ampco Metal, Inc.
Beryllium Corp.
Boyer-Campbell Co.
Cunningham, M. E., Co.
Custanite Corp.
Industrial Prod. Co.
Magline, Inc.
New Jersey Safety Equip. Co.
Nupla Mfg. Co.,
Div. of New Plastic Corp.
Osborn Mfg. Corp.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Tool & Mfg. Co., Inc.
Truck Equip. Co.

Torches, Welding

Dockson Corp.
Draeger Ox. App. Corp.
General Scientific Equip. Co.
Genter, C. D., Co.
Linde Company,
Div. of Union Carbide Corp.

Valves, Air Blast

Littell, F. J., Machine Co.
Vac-U-Mation Div.
Schrader's A., Son

Valves, Gate

OPW-Jordan Corp.
Rochester Safety Equip. Co., Inc.

Valves, Oxygen

Air Reduction Sales Co.
Draeger Ox. App. Corp.
Karel First Aid Supply Co.
Linde Company,
Div. of Union Carbide Corp.
Safety First Supply Co.

Valves, Safety

Air Reduction Sales Co.
Bailey, Wm. M. Co.
Black, Sivalls & Bryson, Inc.
Coppus Engineering Corp.
Safety First Supply Co.
Speakman Co.
Tokheim Corp.

Valves, Steam

Bailey, Wm. M. Co.
Black, Sivalls, & Bryson, Inc.
OPW-Jordan Corp.
Rockwood Sprinkler Co.

Vents, Flame Arresting

Protectoseal Company

Washers, Safety Grinding Wheel

Boyer-Campbell Co.
Genter, C. D., Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Standard Safety Equip. Co.

Wrenches, Hopper Car

Boyer-Campbell Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Safety First Supply Co.

Wrenches, Spanner

Boyer-Campbell Co.
New Jersey Safety Equip. Co.
Proto Tool Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Section 9
Plant Protection

Acid Handling Utensils

American Allsafe Co., Inc.
Boyer-Campbell Co.
Corning Glass Works
Dunn Products
General Scientific Equip. Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Protectoseal Company
Pulmosan Safety Equip. Corp.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.

Alarms, Air Raid

Falcon Alarm Co., Inc.
Federal Sign & Signal Corp.
Fyr-Fyter Co.
Gamewell Company
Halprin Supply Co.
Portable Light Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Alarms, Carbon Monoxide

Draeger Ox. App. Corp.
Gelman Instrument Co.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Union Industrial Equip. Corp.

Alarms, Combustible Gas

Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Johnson-Williams, Inc.
Mine Safety Appliances Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Union Industrial Equip. Corp.

Alarms, Fire

American LaFrance,
Div. of Sterling Precision Corp.
Edwards Co., Inc.
Falcon Alarm Co., Inc.
Federal Sign & Signal Corp.
Fyr-Fyter Co.
Gamewell Company
Grinnell Co., Inc.
Halprin Supply Co.
Kidde Ultrasonic & Detection Alarms, Inc.
Midwest Audio Corp.
Notifier Corp.
Rochester Safety Equip. Co., Inc.
Rockwood Sprinkler Co.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Special Instruments Laboratory, Inc.
Vanguard-Interstate Corp.

Alarms, Ground

Brundee Co.

Alarms, Intrusion

Edwards Co., Inc.
Kidde Ultrasonic & Detection Alarms, Inc.
Notifier Corp.
Scott, H. H., Inc.,
Instrument Div.

Alarms, Radiation

Controls for Radiation, Inc.
Special Instruments Laboratory, Inc.

Alarms, Smoke

Cardox Div.,
Chemetron Corp.
Fyr-Fyter Co.
Gelman Instrument Co.
Notifier Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Arresters, Flame or Spark

Black, Sivalls & Bryson, Inc.
Erickson Products Co.
New Jersey Safety Equip. Co.

Ash Trays, Industrial

Boyer-Campbell Co.
General Scientific Equip. Co.
Hornik, Frederick
Industrial Prod. Co.
Karel First Aid Supply Co.
New Jersey Safety Equip. Co.
Protectoseal Company
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Safety Floor Products
Standard Industrial Prod. Co.

Axes, Fire Poles

American LaFrance,
Div. of Sterling Precision Corp.
Allen, W. D., Mfg. Co.
Atlas Safety Equip. Co., Inc.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
Genter, C. D., Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Batteries

Bright Star Industries
Electric Storage Battery Co.,
Exide Industrial Div.
Genter, C. D., Co.
Gould-National Batteries, Inc.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Union Carbide Consumer Products Co.

Brooms, Fire Fighting

American LaFrance,
Div. of Sterling Precision Corp.
Fyr-Fyter Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Cans, Safety

American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Boyer-Campbell Co.
Eagle Mfg. Co.
Fyr-Fyter Co.
General Scientific Equip. Co.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Justrite Mfg. Co.
New Jersey Safety Equip. Co.
Protectoseal Company
Rochester Safety Equip. Co., Inc.
Rock Royal Corp.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Standard Glove Co.

Communications In-Plants

Kaar Engineering Corp.

Containers, Explosive Liquid

American Allsafe Co., Inc.
General Scientific Equip. Co.
Halprin Supply Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Protectoseal Company
Safety First Supply Co.

Covers, Protective, Valve & Flange

Neirad Industries, Inc.

Covers, Self-Closing

Halprin Supply Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Protectoseal Company

Detectors, Carbon Monoxide

American Allsafe Co., Inc.
Bacharach Industrial Instrument Co.
Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
General Scientific Equip. Co.
Medical Supply Co.
Mine Safety Appliance Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Union Industrial Equip. Corp.
United States Safety Service Co.

Detectors, Fire

Detectogas Instruments, Inc.
Edwards Co., Inc.
Falcon Alarm Co., Inc.
Fenwall, Inc.
Fyr-Fyter Co.
Gamewell Company
Grinnell Co., Inc.
Kidde Ultrasonic & Detection Alarms, Inc.
Mine Safety Appliances Co.
Notifier Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Vanguard-Interstate Corp.

Detectors, Gas

American Allsafe Co., Inc.
Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Detectogas Instruments, Inc.
Draeger Ox. App. Corp.
Gelman Instrument Co.
General Scientific Equip. Co.
Johnson-Williams, Inc.
Linde Company,
Div. of Union Carbide Corp.
Mine Safety Appliances Co.
National Mine Service Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Union Industrial Equip. Corp.

Detectors, Ground

Brundee Co.

Detectors, Radiation

Ameray Corp.
Atomic Accessories Inc.
Controls for Radiation, Inc.
Corning Glass Works
Eastman Kodak Co.
Eberline Instrument Corp.
Gelman Instrument Co.
Kahl Scientific Instrument Corp.
Safety First Supply Co.
St. John X-Ray Laboratory

Detectors, Smoke

Boyer-Campbell Co.
Fyr-Fyter Co.
Gelman Instrument Co.
General Scientific Equip. Co.
Kidde, Walter, & Co., Inc.
Mine Safety Appliances Co.
Notifier Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Doors, Fire and Service

Kinnear Mfg. Co.
Peelle Company
Rochester Safety Equip. Co., Inc.

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Doors, Fire Resistant
Peelle Company
Rochester Safety Equip. Co., Inc.

Dryers, Fire Hose
American LaFrance,
Div. of Sterling Precision Corp.
Fyr-Fyter Co.
Genter, C. D., Co.
Halprin Supply Co.
Safety First Supply Co.

Electronic Indicating Ground
Gilbert & Barker Mfg. Co.

Explosives Carrier
Mine Safety Appliances Co.

Faucets, Self-Closing
General Scientific Equip. Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Protectoseal Company
Rochester Safety Equip. Co., Inc.

Fire Extinguishers
Alim Corp.
Allen, W. D., Mfg. Co.
American Allsafe Co., Inc.
American Industrial Safety Equip. Co.
American LaFrance,
Div. of Sterling Precision Corp.
Ansul Chemical Co.
Boyer-Campbell Co.
Cardox Div.,
Chemetron Corp.
Dietz, R. E., Co.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Kidde, Walter, & Co., Inc.
Lee-Dor Mfg. Co., Inc.
National Foam Systems, Inc.
National Mine Service Co.
Randolph Laboratories, Inc.
Rochester Safety Equip. Co., Inc.
Rockwood Sprinkler Co.
Safety First Products Corp.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.
Stop-Fire, Inc.

Fire Extinguisher Recharges and Equipment
Alim Corp.
Allen, W. D., Mfg. Co.
American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Ansul Chemical Co.
Boyer-Campbell Co.
Du Pont, E. I. de Nemours & Co., Inc.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Kidde, Walter, & Co., Inc.
Lee-Dor Mfg. Co., Inc.
National Foam Systems, Inc.
Randolph Laboratories, Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.

Fire Extinguisher Foam
Akron Brass Mfg. Co., Inc.
Allen, W. D., Mfg. Co.
American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Boyer-Campbell Co.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
National Foam Systems, Inc.
Randolph Laboratories, Inc.
Rochester Safety Equip. Co., Inc.
Rockwood Sprinkler Co.
Safety First Supply Co.
Scientific Industrial Supply Co.
Snyder, M. L., & Son, Inc.

Fire Extinguisher Inspection Tags
Minute Company

Fire Extinguisher Seals
American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Fire Extinguisher Systems
American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Ansul Chemical Co.
Cardox Div.,
Chemetron Corp.
Firetox System, Inc.
Fyr-Fyter Co.
Genter, C. D., Co.
Grinnell Co., Inc
Halprin Supply Co.
Kidde, Walter, & Co., Inc.
National Foam Systems, Inc.
Randolph Laboratories, Inc.
Rochester Safety Equip. Co., Inc.
Rockwood Sprinkler Co.
Safety First Supply Co.

Fire Foam Generators
Akron Brass Mfg. Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Cardox Div.,
Chemetron Corp.
Fyr-Fyter Co.
Genter, C. D., Co.
Halprin Supply Co.
National Foam Systems, Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Fire Hose
Allen, W. D., Mfg. Co.
American Allsafe Co., Inc.
American Biltrite Rubber Co.,
Boston Woven Hose & Rubber Div.
American LaFrance,
Div. of Sterling Precision Corp.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Goodall Rubber Co.
Halprin Supply Co.
National Foam Systems, Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Fire Hose Accessories
Akron Brass Mfg. Co., Inc.
Allen, W. D., Mfg. Co.
American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Bean, John., Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Fire Hose Reels
Allen, W. D., Mfg. Co.
American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Bean, John., Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
National Foam Systems, Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Fire Ladders, Aluminum
Aluminum Ladder Co.
American LaFrance,
Div. of Sterling Precision Corp.
Cleveland Ladder Co.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Truck Equip. Co.

Fire Ladders, Wood
American LaFrance,
Div. of Sterling Precision Corp.
Cleveland Ladder Co.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Industrial Prod. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Truck Equip. Co.

Fire Nozzles
Akron Brass Mfg. Co., Inc.
Allen, W. D., Mfg. Co.
American LaFrance,
Div. of Sterling Precision Corp.
Ansul Chemical Co.
Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
National Foam Systems, Inc.
Rochester Safety Equip. Co., Inc.
Rockwood Sprinkler Co.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Fire Platforms, Aerial
Truck Equip. Co.

Fire Pumps
American LaFrance,
Div. of Sterling Precision Corp.
Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Porto Pump Inc.
Protectoseal Company
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Fire Sirens
American LaFrance,
Div. of Sterling Precision Corp.
Boyer-Campbell Co.
Edwards Co., Inc.
Federal Sign & Signal Corp.
Fyr-Fyter Co.
Gamewell Company
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Notifier Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Fire Trucks, Industrial
American LaFrance,
Div. of Sterling Precision Corp.
Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Genter, C. D., Co.
Halprin Supply Co.
National Foam Systems, Inc.

Flame Retardant, Fabric
American Brattice Cloth Corp.
Cordo Chemical Corp.
Du Pont, E. I. de Nemours & Co., Inc.
Flamort Chemical Co.
Flash Shield Products
Frommelt Industries
Holcomb Safety Garment Co.
Industrial Gloves Co.
Institute of Industrial Launderers
Johns-Manville Sales Corp.
Lynrus Finishing Co., Inc.
Rochester Safety Equip. Co., Inc.
Scientific Industrial Supply Co.
Wheeler Protective Apparel, Inc.

Flame Retardant, Fibre Board
Alim Corp.
Carey, The Philip, Mfg. Co.
Du Pont, E. I. de Nemours & Co., Inc.
Flamort Chemical Co.
Johns-Manville Sales Corp.
Spaulding Fibre Co., Inc.

Flame Retardant, Wood
Alim Corp.
Du Pont, E. I. de Nemours & Co., Inc.
Flamort Chemical Co.

Flashlights
American Allsafe Co., Inc.
Bright Star Industries
Genter, C. D., Co.
Hornik, Frederick
Industrial Prod. Co.
Justrite Mfg. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Tedcar Products Co.
Union Carbide Consumer Products Co.

Flashlights, Permissible
Boyer-Campbell Co.
Bright Star Industries
Carpenter Mfg. Co.
Genter, C. D., Co.
Industrial Prod. Co.
Justrite Mfg. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Union Carbide Consumer Products Co.

Floodlights, Emergency
American Allsafe Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Carpenter Mfg. Co.
Crouse-Hinds Co.
Dietz, R. E., Co.
Electric Cord Co.
Electric Storage Battery Co.,
Exide Industrial Div.
Halprin Supply Co.
Industrial Prod. Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Pyle-National Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Tedcar Products Co.

Fog Guns
Akron Brass Mfg. Co., Inc.
American LaFrance,
Div. of Sterling Precision Corp.
Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Fyr-Fyter Co.

See directory of Safety Equipment Sources for addresses.

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(section 9—continued)

Genter, C. D., Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
West Chemical Prod., Inc.

Fog-Nozzle

Akron Brass Mfg. Co., Inc.
Allen, W. D., Mfg. Co.
American LaFrance,
Div. of Sterling Precision Corp.
Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Rockwood Sprinkler Co.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Gongs, Sirens, Horns, Signaling Devices

Dietz, R. E., Co.
Edwards Co., Inc.
Falcon Alarm Co., Inc.
Federal Sign & Signal Corp.
Fyr-Fyter Co.
Gamewell Company
General Fire Extinguisher Corp.
Genter, C. D., Co.
Halprin Supply Co.
New Jersey Safety Equip. Co.
Notifier Corp.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Trippe Mfg. Co.

Hand Pumps

Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Tokheim Corp.

Hose, Line

American LaFrance,
Div. of Sterling Precision Corp.
Fyr-Fyter Co.
Genter, C. D., Co.
Goodall Rubber Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.

Hydraulic Fluid, Fire Resistant

Celanese Chemical Co.,
Div. Celanese Corp. of Am.
Houghton, E. F., & Co.
Shell Oil Co.
Shell Oil Co. of Canada, Ltd.

Hydrogen Analyzer

Davis Emergency Equip. Co., Inc.
Leeds & Northrup Co.
New Jersey Safety Equip. Co.
Union Industrial Equip. Corp.

Indicators, Carbon Monoxide

American Allsafe Co., Inc.
Bacharach Industrial Instrument Co.
Boyer-Campbell Co.
Draeger Ox. App. Corp.
General Scientific Equip. Co.
Mine Safety Appliances Co.
National Mine Service Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Union Industrial Equip. Corp.
United States Safety Service Co.

Indicators, Flammable Vapors

Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Detectogas Instruments, Inc.
Draeger Ox. App. Corp.
General Scientific Equip. Co.
Johnson-Williams, Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Safety First Supply Co.
Union Industrial Equip. Corp.

Indicators, Gas

Boyer-Campbell Co.
Davis Emergency Equip. Co., Inc.
Detectogas Instruments, Inc.
Draeger Ox. App. Corp.
Gelman Instrument Co.
General Scientific Equip. Co.
Johnson-Williams, Inc.
Mine Safety Appliances Co.
National Mine Service Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Union Industrial Equip. Corp.

Insurance

Employers Mutual of Wausau

Lamps, Emergency

American Allsafe Co., Inc.
American Optical Co.
Safety Products Div.
Boyer-Campbell Co.
Carpenter Mfg. Co.
Electric Cord Co.
Fyr-Fyter Co.
Halprin Supply Co.
Industrial Prod. Co.
Justrite Mfg. Co.
Lewis Instruments Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Portable Light Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Tedcar Products Co.
U-C-Lite Mfg. Co.

Lamps, Explosion Proof

Boyer-Campbell Co.
Carpenter Mfg. Co.
Electro Powerpacs Inc.
Ericson Mfg. Co.
Halprin Supply Co.
Industrial Prod. Co.
Justrite Mfg. Co.
New Jersey Safety Equip. Co.
Pyle-National Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Swivelier Company, Inc.
U-C-Lite Mfg. Co.

Lamps, Vapor Proof

Boyer-Campbell Co.
Carpenter Mfg. Co.
Ericson Mfg. Co.
Halprin Supply Co.
Joy Mfg. Co.,
Electrical Prod. Div.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Pyle-National Co.
Rochester Safety Equip. Co., Inc.

Leak Testing Solution

Flamort Chemical Co.

Lighting, Emergency

American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Carpenter Mfg. Co.
Crouse-Hinds Co.
Electric Cord Co.
Electric Storage Battery Co.
Exide Industrial Div.
General Scientific Equip. Co.
Industrial Prod. Co.
Lewis Instruments Inc.
Mine Safety Appliances Co.
Portable Light Co., Inc.
Pyle-National Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Tedcar Products Co.
U-C-Lite Mfg. Co.

Lighting Units, Portable

American LaFrance,
Div. of Sterling Precision Corp.
Carpenter Mfg. Co.
Dietz, R. E., Co.
Electric Cord Co.
Electric Storage Battery Co.,
Exide Industrial Div.
Industrial Prod. Co.
Joy Mfg. Co.,
Electrical Prod. Div.
Lewis Instruments Inc.
Luxo Lamp Corp.
Portable Light Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Swivelier Company, Inc.
Tedcar Products Co.
U-C-Lite Mfg. Co.
Union Carbide Consumer Prod. Co.

Lights, Emergency, Battery

American Optical Co.,
Safety Products Div.
Boyer-Campbell Co.
Carpenter Mfg. Co.
Dietz, R. E., Co.
Electric Cord Co.
Electric Storage Battery Co.,
Exide Industrial Div.
Electro Powerpacs Inc.
General Scientific Equip. Co.
Industrial Prod. Co.
Justrite Mfg. Co.
Lewis Instruments Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Portable Light Co., Inc.
Rochester Safety Equip. Co., Inc.
Safety Clothing & Equip. Co.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Tedcar Products Co.
U-C-Lite Mfg. Co.
Union Carbide Consumer Products Co.

Lights, Emergency, Vehicle

Carpenter Mfg. Co.
Dietz, R. E., Co.
Federal Sign & Signal Corp.
Fyr-Fyter Co.
Portable Light Co., Inc.
Pyle-National Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Tedcar Products Co.
Trippe Mfg. Co.
Vari-Products Co.

Lights, Warning

Carpenter Mfg. Co.
Dietz, R. E., Co.
Federal Sign & Signal Corp.
Fyr-Fyter Co.
General Scientific Equip. Co.
Industrial Prod. Co.
Justrite Mfg. Co.
New Jersey Safety Equip. Co.
Portable Light Co., Inc.
Protectoseal Company
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Tedcar Products Co.
Trippe Mfg. Co.
U-C-Lite Mfg. Co.
Vari-Products Co.

Megaphones, Transistor-powered

Audio Equipment Co., Inc.
Falcon Alarm Co., Inc.
General Scientific Equip. Co.
Halprin Supply Co.
New Jersey Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Wheeler Protective Apparel, Inc.

Nozzles

Akron Brass Mfg. Co., Inc.
Allen, W. D., Mfg. Co.
American LaFrance,
Div. of Sterling Precision Corp.
Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
Halprin Supply Co.
National Foam System, Inc.
OPW-Jordan Corp.
Rochester Safety Equip. Co., Inc.
Rockwood Sprinkler Co.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Tokheim Corp.
West Chemical Prod., Inc.

Paint, Fire Resistant

Albi Mfg. Co., Inc.
Alim Corp.
Boyer-Campbell Co.
Du Pont, E. I. de Nemours & Co., Inc.
Flamort Chemical Co.
Kelly, The, Paint Co.
Pittsburgh Plate Glass Co.
Rochester Safety Equip. Co., Inc.

Pressure Relief Devices

Black, Sivalls & Bryson, Inc.
Draeger Ox. App. Corp.
OPW-Jordan Corp.

Public Address Systems

Audio Equipment Co., Inc.
Fyr-Fyter Co.
Rochester Safety Equip. Co., Inc.

Pumps, Acid

American Allsafe Co., Inc.
Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
General Scientific Equip. Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.
Thompson Mfg. Co., Inc.
Tokheim Corp.

Pumps, Foam

American LaFrance,
Div. of Sterling Precision Corp.
Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Cardox Div.,
Chemetron Corp.
Halprin Supply Co.
Safety First Supply Co.

Pumps, Hand Operated

Blackmer Pump Co.
Draeger Ox. App. Corp.
New Jersey Safety Equip. Co.
Practical Mfg. Co.
Protectoseal Company
Rochester Safety Equip., Co., Inc.
Thompson Mfg. Co., Inc.
Tokheim Corp.

Pumps, High Pressure

Bean, John, Div., Industrial Sales Dept.,
Food Machinery & Chemical Corp.
Draeger Ox. App. Corp.
New Jersey Safety Equip. Co.
Porto Pump Inc.
Rochester Safety Equip. Co., Inc.

Racks, Fire Hose

Allen, W. D., Mfg. Co.
Elkhart Brass Mfg. Co., Inc.
Fyr-Fyter Co.
Genter, C. D., Co.
Halprin Supply Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

To locate Advertisements, see Advertisers' Index.

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Searchlights
Dietz, R. E., Co.
Genter, C. D., Co.
Portable Light Co., Inc.
Safety First Supply Co.
U-C-Lite Mfg. Co.

Smoker's Stand
Davenport, A. C., & Son, Inc.
Genter, C. D., Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Standard Industrial Prod. Co.

Sprinkler Systems
Fyr-Fyter Co.
Gamewell Company
Rockwood Sprinkler Co.

Static Neutralizers
Sticht, Herman H., Co., Inc.

Syphons, Acid
American Allsafe Co., Inc.
Boyer-Campbell Co.
General Scientific Equip. Co.
Industrial Prod. Co.
New Jersey Safety Equip. Co.
Pendergast, Albert W., Safety Equip. Co.
Rochester Safety Equip. Co., Inc.
Safety First Supply Co.
Thompson Mfg. Co., Inc.

Television, Industrial In-Plant
Blonder-Tongue Laboratories, Inc.
General Precision, Inc.
GPL Division
Midwest Audio Corp.
Special Instruments Laboratory, Inc.

Towers, Fire Aerial
Akron Brass Mfg. Co., Inc.
Bethlehem Steel Co.
Halprin Supply Co.
Truck Equip. Co.

Training Program, Fire Prevention
Bean, John, Div., Industrial Sales Dept., Food Machinery & Chemical Corp.
Fyr-Fyter Co.
Halprin Supply Co.

Valves, Drum
Central Safety Equip. Co.
OPW-Jordan Corp.
West Chemical Prod., Inc.

Vent, Fire Automatic Fusible Link
Wasco Products, Inc.

Watchmen's Clock Systems
Detex Watchclock Corp.
Lathem Time Recorder Co.
Notifier Corp.
Snyder, M. L., & Son, Inc.
Special Instruments Laboratory, Inc.

Weed Killers
Allied Chemical Corp.,
General Chemical Div.
Brulin & Co., Inc.
Diamond Alkali Co.
Dolge, C. B., Co.
Dow Chemical Co.
Du Pont, E. I. de Nemours & Co., Inc.
Geigy Agricultural Chemicals,
Div. of Geigy Chemical Corp.
Huntington Laboratories, Inc.
United States Borax & Chemical Corp.
United States Rubber Co.
West Chemical Prod., Inc.

Wetting Agent for Fire Fighting
American LaFrance,
Div. of Sterling Precision Corp.
Central Safety Equip. Co.
Fyr-Fyter Co.
Halprin Supply Co.
National Foam Systems, Inc.
Penetone Company
Rochester Safety Equip. Co., Inc.
Rockwood Sprinkler Co.
Safety First Supply Co.
Snyder, M. L., & Son, Inc.

Section 10
Nuclear Radiation

Aprons, Radiation
Advance Glove Mfg. Co.
Allied Glove Corp.
Associated Bag & Apron Co.
Cordo Chemical Corp.
Eastern Safety Equip. Co., Inc.
General Scientific Equip. Co.
Genter, C. D., Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Standard Glove Co.
Tracerlab Inc.

Badges, Film
Adept Industries, Inc.
Atomic Accessories Inc.
Controls for Radiation, Inc.
Eastman Kodak Co.
Landauer, R. S., Jr., & Co.
Nuclear-Chicago Corp.
St. John X-Ray Laboratory
Tracerlab Inc.
U. S. Nuclear
X-Ray Monitoring Corp.

Building Materials, Lead
Atomic Accessories Inc.
Scientific Industrial Supply Co.

Bricks, Lead, Interlocking
Nuclear Measurements Corp.
Scientific Industrial Supply Co.
Tracerlab Inc.
U. S. Nuclear

Clothing, Lead Lined
Advance Glove Mfg. Co.
Allied Glove Corp.
Charleston Rubber Co.
General Scientific Equip. Co.
Midwest Glove Co., Inc.
New Jersey Safety Equip. Co.

Coats, Radiation
Advance Glove Mfg. Co.
Allied Glove Corp.
General Scientific Equip. Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Standard Glove Co.

Containers, Lead
Atomic Accessories Inc.
Midwest Glove Co., Inc.
Radiation Engineered Services
Tracerlab Inc.
U. S. Nuclear

Coating, Protective
Eversbield Prod. Inc.

Lint Free Caps & Hoods
Defense Apparel

Lint Free Coveralls
Defense Apparel

Lint Free Nylon Gloves
Defense Apparel

Lint Free Protective Plastic Shoe Covers
Defense Apparel

Lint Free Wipers
Defense Apparel

DETECTION INSTRUMENTS, RADIATION

Geiger-Mueller, Beta
Atomic Accessories Inc.
Eberline Instrument Corp.
Gelman Instrument Co.
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Special Instruments Laboratory, Inc.
Sperry Microwave Electronics Co.
Tracerlab Inc.
Universal Transistor Products Corp.
U. S. Nuclear
Victoreen Instrument Co.

Geiger-Mueller, Gamma
Atomic Accessories Inc.
Eberline Instrument Corp.
Gelman Instrument Co.
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Special Instruments Laboratory, Inc.
Sperry Microwave Electronics Co.
Tracerlab Inc.
Universal Transistor Products Corp.
U. S. Nuclear
Victoreen Instrument Co.

Hand, Alpha
Atomic Accessories Inc.
Eberline Instrument Corp.
Kahl Scientific Instrument Corp.
Sperry Microwave Electronics Co.
Tracerlab Inc.
Universal Transistor Products Corp.

Hand & Foot Beta, Gamma
Atomic Accessories Inc.
Eberline Instrument Corp.
Kahl Scientific Instrument Corp.
Sperry Microwave Electronics Co.
Tracerlab Inc.
Universal Transistor Products Corp.

Ionization Chamber, Alpha, Beta, Gamma
Atomic Accessories Inc.
Eberline Instrument Corp.
Gelman Instrument Co.
Kahl Scientific Instrument Corp.
Landsverk Electrometer Co.
Riggs Nucleonics,
Sub. Int'l Electronic Research Corp.
Special Instruments Laboratory, Inc.
Sperry Microwave Electronics Co.
Tracerlab Inc.
Union Industrial Equip. Corp.
U. S. Nuclear
Victoreen Instrument Co.

Portable Battery
Sperry Microwave Electronics Co.

Scintillation Counter, Alpha
Eberline Instrument Corp.
Sperry Microwave Electronics Co.
Tracerlab Inc.
Universal Transistor Products Corp.
U. S. Nuclear
Victoreen Instruments Co.

Scintillation Counter, Gamma
Sperry Microwave Electronics Co.
Tracerlab Inc.
Universal Transistor Products Corp.
U. S. Nuclear
Victoreen Instrument Co.

Dosimeters
Atomic Accessories Inc.
Bendix Aviation Corp.,
Cincinnati Div.
Corning Glass Works
Kahl Scientific Instrument Corp.
Landsverk Electrometer Co.
Nuclear-Chicago Corp.
Sperry Microwave Electronics Co.
Tracerlab Inc.
Universal Transistor Products Corp.
U. S. Nuclear
Nuclear-Chicago Corp.

LABORATORY INSTRUMENTS, RADIATION

Analyzers, Pulse Height
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Victoreen Instrument Co.
Tracerlab Inc.
Universal Transistor Products Corp.

Sample Charger, Automatic
Kahl Scientific Instrument Corp.
Tracerlab Inc.
Victoreen Instrument Co.

See directory of Safety Equipment Sources for addresses.

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Scalers
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Tracerlab Inc.
U. S. Nuclear
Victoreen Instrument Co.

Scintillation Spectrometers, Automatic
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Tracerlab Inc.
Victoreen Instrument Co.

Laundry Equipment, Radioactive
Controls for Radiation, Inc.
Victoreen Instrument Co.

Masks, Gas, Radioactive
Acme Protection Equip. Co.
Draeger Ox. App. Corp.
Genter, C. D., Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Mittens, Radiation
Advance Glove Mfg. Co.
Allied Glove Corp.
Genter, C. D., Co.
Midwest Glove Co., Inc.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.

Moniter, Radio-Aerosol
Controls for Radiation, Inc.
Eberline Instrument Corp.
Gelman Instrument Co.
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Victoreen Instrument Co.

Paints, Strippable
Guard Coatings Corp.

Radiography Equipment
Midwest Glove Co., Inc.
Radiation Engineered Services
St. John X-Ray Laboratory
Tracerlab Inc.
U. S. Nuclear

Reactors, Experimental
Ameray Corp.

Recorders, Radiation
Atomic Accessories Inc.
Bendix Aviation Corp.,
Cincinnati Div.
Controls for Radiation, Inc.
Leeds & Northrup Co.
Nuclear Measurements Corp.
Riggs Nucleonics Corp.,
Sub. Int'l Electronic Research Corp.
Tracerlab Inc.
Union Industrial Equip. Corp.
Victoreen Instrument Co.

Respirators, Radioactive Dust, Fumes
American Optical Co.,
Safety Products Div.
Draeger Ox. App. Corp.
General Scientific Equip. Co.
Genter, C. D., Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Samplers, Air
Atomic Accessories Inc.
Davis Emergency Equip. Co., Inc.
Draeger Ox. App. Corp.
Eberline Instrument Corp.
Gast Mfg. Co.
Gelman Instrument Co.
Genter, C. D., Co.
Kahl Scientific Instrument Corp.
Karel First Aid Supply Co.
Mine Safety Appliances Co.
Nuclear Measurements Corp.
Staplex Company,
Air Sampler Div.
Tracerlab Inc.
U. S. Nuclear
Victoreen Instrument Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Samplers, Dust
Draeger Ox. App. Corp.
Eberline Instrument Corp.
Gelman Instrument Co.
Genter, C. D., Co.
Kahl Scientific Instrument Corp.
Karel First Aid Supply Co.
Mine Safety Appliances Co.
New Jersey Safety Equip. Co.
Nuclear Measurements Corp.
Staplex Company
Air Sampler Div.
Tracerlab Inc.
U. S. Nuclear
Victoreen Instrument Co.
Willson Prod. Div.,
Ray-O-Vac Co.

Service, Bio-Assay
Atomic Research Laboratory
Controls for Radiation, Inc.
Occupational Hygiene Services
Tracerlab Inc.
U. S. Nuclear

Service, Consultation, Radioactive
Atomic Research Laboratory
Controls for Radiation, Inc.
Radiation Engineered Services
St. John X-Ray Laboratory
Tracerlab Inc.
U. S. Nuclear

Service, Film Badge
Adept Industries, Inc.
Atomic Accessories Inc.
Controls for Radiation, Inc.
Landauer, R. S., Jr., & Co.
Nuclear-Chicago Corp.
St. John X-Ray Laboratory
Tracerlab Inc.
U. S. Nuclear
X-Ray Monitoring Corp.

Shield, Lead, Adjustable
Ameray Corp.
Kahl Scientific Instrument Corp.
Midwest Glove Co., Inc.
Tracerlab Inc.
U. S. Nuclear

Shield, Lead, Flow Counter
Ameray Corp.
Atomic Accessories Inc.
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Tracerlab Inc.
U. S. Nuclear
Victoreen Instrument Co.

Shield, Lead, Geiger Tube Probe
Ameray Corp.
Atomic Accessories Inc.
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Tracerlab Inc.
U. S. Nuclear

Shield, Lead, Horizontal
Ameray Corp.
Atomic Accessories Inc.
Kahl Scientific Instrument Corp.
Nuclear Measurements Corp.
Tracerlab Inc.
U. S. Nuclear

Shield, Lead, Vertical
Ameray Corp.
Atomic Accessories Inc.
Kahl Scientific Instrument Corp.
Midwest Glove Co., Inc.
Nuclear Measurements Corp.
Tracerlab Inc.
U. S. Nuclear

Signs, Warning, Radioactive
Adept Industries, Inc.
Ad-O-Plastic
Atomic Accessories Inc.
Canisteo Sign & Mfg. Co., Inc.
Mine Safety Appliances Co.
Nuclear Measurements Corp.
Pendergast, Albert W., Safety Equip. Co.
Prairie State Prod. Co.
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Victoreen Instrument Co.
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Geiger-Mueller, Vehicle Use
Atomic Accessories Inc.
Eberline Instrument Corp.
Kahl Scientific Instrument Corp.
Tracerlab Inc.
Universal Transistor Products Corp.
U. S. Nuclear
Victoreen Instrument Co.

Ionization Chamber, Discriminating
Atomic Accessories Inc.
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Landswerk Electrometer Co.
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Alpha, Beta, Gamma
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Ionization Chamber, Civil Defense
Kahl Scientific Instrument Corp.
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Ionization Chamber, Fast Neutron
Atomic Accessories Inc.
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Proportional Counter, Neutrons
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Scintillation Counter
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Advance Glove Mfg. Co.
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Glove Boxes
Ameray Corp.
General Scientific Equip. Co.
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Hoods
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Fyr-Fyter Co.
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Hornik, Frederick
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Ready Made Sign Co., Inc.
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Williams Jewelry & Mfg. Co.

Boards, Changeable Letter
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Standard Glove Co.
Stephen-William Co.

Books on Safety
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Halprin Supply Co.
National Safety Council
Reinhold Publishing Corp.
Safety First Supply Co.

Bulletin Boards
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Boyer-Campbell Co.
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Pyramid Film Products, Ltd.
Rockwood Sprinkler Co.
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Advertised Products

—feature equipment and services that will help you solve accident problems in your plant. Instead of making a "mental note," make sure you get full information by sending in the card. If no item number appears with an ad, it will be found on the opposite page, next to the arrow. Cover position ads are shown on the cards as: IFC—inside front cover; IBC—inside back cover; BC—back cover.

IMPORTANT—Be sure to fill in your name, organization and address in the space provided on this side of the postcard.

Please send me more information on the items circled below: **MARCH 1960**

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15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
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Please print your name and company in full—do not abbreviate

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

CITY & STATE _____

Please send me more information on the items circled below: **MARCH 1960**

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Please print your name and company in full—do not abbreviate

NAME _____

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COMPANY _____

ADDRESS _____

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. . . your guide to products of importance and help to your plant safety program

Keep up-to-the-minute on all the latest advances in industrial safety products and services through the advertising pages and new safety equipment features in the NATIONAL SAFETY NEWS.

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Before you mail your Reader Service postcard . . . TAKE ANOTHER LOOK at the ADVERTISING PAGES

Make sure all the items you want to know more about are circled . . . check to make sure your name, organization, and address are printed on the reverse side of the postcard . . . THEN mail it today.

New CESCO MULTI-PLY WINDOWS

pass molten lead and air rifle "torture" tests

Here's dramatic, conclusive proof of resistance to heat and impact like you've never seen in a face shield window before! CESCO's new Multi-Ply windows were subjected to these torture tests with results that speak for themselves...

TEST NO. 1

A .22 cal. air rifle with a muzzle velocity of 450 ft. per sec. was fired at a .045" Multi-Ply window from a distance of 35 feet. Only a small superficial dent resulted. There was no shattering, no penetration. However, the same gun fired from the same distance pierced .032" Aluminum (24ST3) and .040" Cellulose Acetate regularly used for face shield windows.

TEST NO. 2

A ladle containing 6½ lbs. of 635 degree molten lead was poured on a Multi-Ply window for 45 seconds. Though the hot lead was poured on the same spot, none of it penetrated the window. Under identical circumstances a .040" acetate window melted in 9 seconds after only ½ lb. of lead was poured.

• Heretofore the only way to be assured of increased resistance to heat and impact was to buy a window of increased thickness. But now CESCO Multi-Ply offers you vastly superior protection in one low-priced, volume-produced window—just .045" thick. Multi-Ply is available in CESCO's six basic face shields—featuring fiber glass crowns and shells—new G-3 Nylanite headgear. Readily interchangeable with hard hats, the G-3 has a broad pivoting cross band adjustable for height and an offset cambered rear headband that's the last word in comfort.

CESCO

Write **for free booklet giving prices and full details about Multi-Ply windows**

CESCO FOR SAFETY

CHICAGO EYE SHIELD COMPANY, 2705 West Roscoe Street, Chicago 18, Illinois

Circle Item No. IBC—Reader Service Card

1. Twin cartridge respiratory protection against pneumoconiosis-producing dusts, toxic dusts, pneumoconiosis-producing mists, chromic acid mist, metal fumes, organic vapors and metallic mercury vapors or combinations of these hazards simultaneously. One of our R5000 interchangeable series. Specify R5089.

4. Provides protection against metallic mercury vapors, organic vapors, dusts and mists. The R-88 cartridges used in this respirator, offer 8 to 9 times the average service life of the average competitive units. Specify R5088.

2. Provides 30 different respirator-goggle combinations with one basic mask — saves inventory. Respirator section is a lightweight rubber mask within a mask. Goggle section has a single impact-resistant acetate lens. Series No. is R4000.

5. Meet AO "Thermogarb", a lightweight, coated asbestos cloth for molten splash protection. After 42½ minutes of exposure to 3000°F molten splash, material had no burn thru or penetration. Available in a complete line of body protection.

3. "Kool-Vent" is a revolutionary face shield that both ventilates and permits a *clear* look ahead! Unit is 24 mesh screen except for the section of quality acetate immediately before the eyes. Particularly desirable for hot operations. Easy adjustment for head size.

6. Handfuls of Safety and Visibility! AO gives you both with "SAF-T-GLO" Gloves. Vivid orange color for signaling safety. Jersey lining coated with special vinyl. Liquid proof. Positive grip even on oily or greasy objects. Rugged, won't crack or peel. Excellent abrasion and solvent resistance. For plant security personnel, oil refineries, aircraft and crane signalling, surveying and many other uses. AO 1402 Knitwrist shown.

9 NEW AO SURE-GUARD PRODUCTS

That Prevent Injury — Cut Costs

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS
Safety Service Centers in Principal Cities

Always insist on ® Trademarked Safety Products. Your nearest AO Safety Products Representative can supply you.

7. Protects forehead, nose and part of the lower face (as well as the eye area) against molten metal splash and radiant heat. Nose section has a plastic hook to which a fireproof drape attaches for neck-chest protection. Indirect ventilation provides twice the fogging resistance of similar goggle. Specify the AO 711 chemical Goggle.

8. The AO "Flexi-Fit" with saddle bridge, simplifies the fitting of plano spectacles — unlike Safety ℞ spectacles which require the full range of eye and bridge sizes for proper fitting. Tests prove that Flexi-Fit will fit more workers than comparable products.

9. *Q. What protects and fits practically all workers?*
A. Our new Coverglas Goggle — chipper's model illustrated. Simplifies lens stocks because lenses measure 50 mm. rd. — the standard type in most cup goggles. Increased ventilation. Frames are cellulose acetate, opaque brown. Adjustable leather bridge standard. Specify No. 325.

Be Safe for Sure . . . With AO SURE-GUARD Equipment

Circle Item No. BC—Reader Service Card